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GAS TRAINING (AUST.)

1942

(Gas Training (Aust.), 1942, cancels Pamphlets No. 1 and No. 2 and Secs. 29 to 33 and 42 to 44 of Pamphlet No. 3 of the Manual of Protection against Gas and Air Raids.)

Adapted for Australia from War Office Publication "Gas Training 1942" by General Staff L.H.Q. and issued by direction of the Commander-in-Chief.

(Reprinted with Amendt. No. 1 and Appendices F, G and H, 1943.)

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PREFATORY NOTE

Gas Training (Aust.), 1942, contains information on the subject of gas which every officer should know. It contains in simple lesson form (Chapter II) the gas knowledge required by every man and the additional gas knowledge (Chapter III) required by junior leaders. Instructions for the use of gas training expedients (Chapter IV) are included. The introduction (page 1) should be carefully studied.

DISTRIBUTION

All Arms 1 copy to each Officer and N.C.O.

CONTENTS

SEC.		PAGE
	Prefatory note	i
	Introduction	1
CHAPTER I—PRINCIPLES AND SYSTEM OF TRAINING		
1.	General instructions	3
2.	Individual soldiers	4
3.	Junior leaders	5
4.	Gas officers and gas N.C.Os.	6
CHAPTER II—INITIAL LESSONS		
5.	War gases	6
6.	Personal gas equipment	8
7.	Description and care of respirator	11
8.	Carriage of respirator	13
9.	Respirator drill	14
10.	Gas cape and light gas suit	16
11.	Personal decontamination	17
12.	Decontamination of weapons and vehicles	20
13.	Blister gas detectors and gas warning signs	22
14.	Gas alarm system and gas duties of sentries	23
CHAPTER III—FURTHER LESSONS FOR JUNIOR LEADERS		
15.	Tests of elementary training	25
16.	Fitting of respirators	27
16A.	Disinfection of service respirators	28
17.	Gas chamber test	30
18.	Inspection of gas equipment	31
19.	Enemy gas weapons and gas intelligence	32
20.	Effects of weather and ground on gas	35
21.	Blister gases	36
22.	Effects of gas on food and water; blister gas reconnaissance; and decontamination of ground	38

CHAPTER IV—TRAINING EXPEDIENTS

SEC.	PAGE
23. Choking gas expedients	40
24. Nose gas expedients	41
25. Tear gas attack	42
26. Blister gas attack	42
27. Gas chambers	44
28. Gas compounds	44

CHAPTER V—SUITABLE OUTDOOR PROBLEMS

29. Action when choking gas is encountered	45
30. Action when nose gas is encountered	46
31. Offensive action in the presence of gas	46
32. Blister gas from ground burst projectiles	47
33. Blister gas spray when on the move	47
34. Blister gas spray when at rest	48
35. Work on ground contaminated by blister gas	48
36. Handling of stores contaminated by blister gas	49
37. Action of a gas reconnaissance party	49
38. Choking gas against moving tanks	50
39. Blister gas against moving tanks	50
40. Blister gas against halted tanks	51

APPENDICES

Appendix A.—Gas training inspections	52
Appendix B.—Notes on the gas film	53
Appendix C.—Syllabus for the gas training of recruits	54
Appendix D.—Syllabus for the gas training of junior leaders	55
Appendix E.—Notes on respirator carriage and drill	57
Appendix F.—Part I. Description and Care of Light Respirator	58
Part II. Carriage and Drill for Light Respirator	60
Appendix G.—Phosgene for training	62
Appendix H.—Exercises in Blister Gas	63

INTRODUCTION

1. Gas is a weapon of war like the bullet and the shell. The soldier must accept all necessary war risks against gas, as he does against bullet and shell. He must not be diverted from his object by seeking complete protection and avoiding all risks.

2. The variety of ways in which an enemy may use gas gives rise to a large number of questions concerned with protection against it. It is impossible to provide, in advance, a solution to every problem that may arise.

3. Every officer and man is responsible for his own individual protection against gas, and he is provided with the necessary means as part of his personal equipment. Complete personal protection is afforded by the service respirator against the action of all war gases, except against the effects of blister gas upon the skin.

4. Protection against blister gas is, in fact, the main problem. Complete protection could be afforded only by the wearing of special garments in which the soldier could neither fight, nor live, nor perform many of the duties which are required when out of actual contact with the enemy. Since this solution is obviously impracticable, it follows that something less than complete protection has to be aimed at; in other words, that certain risks have to be run, the degree of acceptable risk depending on the local situation. In appreciating what risks are involved in any particular set of circumstances, and in deciding which to accept, commanders and junior leaders must be prepared to use their military and gas knowledge and their common sense.

5. By gas knowledge is meant an understanding of the characteristics and methods of use of the various war gases and the effects of ground and weather upon them, and familiarity with the capabilities and limitations of the service gas equipment. These matters are described in the present publication.

6. A soldier who becomes contaminated by blister gas liquid is not an immediate casualty and does not necessarily become one. If he takes the correct action (personal decontamination) in time he should not become a casualty at all.

7. As for what are, and what are not, legitimate war risks, it may be said generally that the risk of contamination in the forward area will normally have to be accepted, just as risks from shells and bullets have to be accepted, since the soldier must be able to develop his full fighting powers. Troops in reserve and those in action, though not in close contact with the enemy, can make more use of their gas equipment and still carry out their tasks satisfactorily; therefore they need not accept the same risks. All troops carry in their personal equipment the means of telling whether they have been sprayed, and the means of countering the effects of any spray which falls upon them. Consequently, troops in areas out of range of the enemy's ground weapons run no great risks, especially as the changing of their clothing, if necessary, presents comparatively few difficulties.

8. No troops should be subjected to the risk of being blinded by blister gas liquid from a drop of spray or the splash from a ground weapon if it can possibly be prevented. Eyeshields should habitually be worn when in the open by all troops who can do so without detriment to their duties. The order to commence this precaution will be issued by the General Staff.

9. The suddenness with which gas is liable to be encountered, and the fact that personal responsibility for individual protection rests upon every officer and man, makes it imperative that training in the use of the gas equipment should reach a high standard. When suddenly confronted with gas the individual will then know instinctively what action to take, while good unit discipline will ensure that no precautions are relaxed unnecessarily.

GAS TRAINING

CHAPTER I—PRINCIPLES AND SYSTEM OF TRAINING

1. General instructions

1. *Principles.*—The first principle of training is to give the individual a thorough knowledge of his duties. The commander of each unit or sub-unit is responsible for the training of his command. Superiors exercise their functions of guidance and control. Gas training is part of the normal training of all ranks.

2. *Object.*—The object of gas training is to ensure that individuals and units are capable of protecting themselves against all forms of gas attack with the minimum loss of efficiency; that is, to ensure that the soldier will be able to fight despite the presence of gas.

3. *Policy.*—The onus of protecting himself against gas lies on the individual; every individual, therefore, is issued with personal gas equipment; Protection against gas is not a subject for a few specialists only. Every individual should be trained; there can be no exceptions. Individual men are taught by junior leaders. Gas officers and gas N.C.Os. are required to train junior leaders. Supervision by superiors who are themselves trained is necessary.

4. *Individual soldiers.*—Individual soldiers should be taught essentials, and given confidence. Frequent short periods of practice in the use of personal gas equipment are necessary to maintain gas discipline. (Sec. 2.)

5. *Junior leaders.*—Junior officers and N.C.Os. should be trained as gas instructors of their men, and taught how to deal with the gas problems they will meet in the field. (Sec. 3.)

6. *Gas officers and gas N.C.Os.*—Selected officers and N.C.Os. are trained at the Army Gas School. Their duties are given in Sec. 4. The minimum numbers required are:—

- i. One gas officer in each lieutenant-colonel's command.
- ii. One gas officer in each R.A.E. squadron and company.
- iii. One gas N.C.O. in each battery, squadron, company, and equivalent sub-unit.

7. *Staff officers.*—Staff officers with specialist training in gas warfare are appointed to assist in maintaining an efficient standard of gas training throughout the formation, to assess the probable dangers from the use of gas by the enemy in the formation area and, in the event of orders being given for retaliation, to advise the commander on the use of gas against the enemy.

8. *Commanding officers.*—C.Os. should be sufficiently familiar with the details of the subject to use their juniors effectively and to ensure that the gas equipment provided is properly maintained and used. Notes on gas training inspections are given at Appendix A.

9. *Training expedients.*—To provide realism in training the following expedients are issued:—

Choking gas.—Phosgene in small cylinders; C.A.P. generators.

Nose gas.—D.M. ampoules; D.M. generators.

Tear gas.—C.A.P. capsules; B.B.C.

Blister gas.—Mustard gas in pint pots; blister gas training mixture.

Thunderflashes, or other expedients used to represent high explosive projectiles, should be used in situations in which gas training expedients are employed, except the direct contamination of ground. Blister gas spray can be simulated by means of a stirrup pump spraying blister gas training mixture. Gas chambers can be improvised. Phosgene, mustard gas, and B.B.C. are supplied for use at gas compounds. (Secs. 23 to 28.)

10. *Collective training*.—Special gas exercises are not recommended during collective training. Better value is obtained by introducing gas problems in all exercises. Realism is essential, and calls for the proper use of training expedients and careful umpiring. Suitable problems, primarily intended to exercise junior leaders and men, are given in Secs. 29 to 40.

11. *Enthusiasm*.—Until the gas weapon is used there will be difficulty in maintaining enthusiasm for gas training. Enthusiasm is, however, one of the first essentials of training. Gas is likely to be used on a large scale. The first attacks are always the most dangerous, and may have a surprise effect on men who have not experienced gas in war. The British Army is well equipped to meet gas; the degree of danger therefore depends on the state of training and maintenance of gas discipline. "A little and often" is a useful method with gas training. (Sec. 15, para. 12.)

2. Individual soldiers

1. *Standard to be attained*.—The soldier should be taught:—

- i. War gases.—That any feeling of choking, irritation of the nose or eyes, any suspicious smell, any suspicious liquid, or any hostile smoke, should be treated as a war gas until proved otherwise. He should be given experience of a tear gas and a nose gas, and be shown an example of a choking gas and a blister gas.
- ii. Equipment.—The various articles of personal gas equipment, their uses, how they are carried and how to take care of them.
- iii. Respirator.—Description and care. Carriage of respirator. Respirator drill, in which he should become highly proficient. He should be given confidence in the respirator by means of gas chamber tests, and should be exercised in carrying out normal duties with the facepiece adjusted by day and by night.
- iv. Decontamination.—Personal decontamination, and decontamination of his weapons and of vehicles.
- v. Gas alarm system.—The difference in the methods of protection against blister gas spray and other forms of gas attack; this difference necessitates frequent practice in the immediate action to be taken on hearing the gas "rattle" alarm or the shout of "gas" and the verbal warning "spray." The use of gas detectors and gas warning signs. The gas duties of sentries.

2. *Initial lessons*.—Instructors at training centres and junior leaders in units should be trained to teach their men the following initial lessons:—

- i. War gases (Sec. 5).
- ii. Personal gas equipment (Sec. 6).
- iii. Description and care of respirator (Sec. 7).
- iv. Carriage of respirator (Sec. 8)
- v. Respirator drill (Sec. 9).
- vi. Gas cape and light gas suit (Sec. 10).
- vii. Personal decontamination (Sec. 11).
- viii. Decontamination of weapons and vehicles (Sec. 12).
- ix. Gas detectors and gas warning signs (Sec. 13).
- x. Gas alarm system and gas duties of sentries (Sec. 14).

3. Further training.—In addition, under a gas officer or gas N.C.O., the soldier should be:—

- i. Given confidence in the respirator by a gas chamber test, early in his training. (In the absence of a gas officer or gas N.C.O. this test may be conducted by an officer or selected N.C.O., who has qualified on a unit junior leader's gas course.) (Sec. 17.)
- ii. Given experience of a nose gas and a persistent tear gas, shown a war example of a choking gas and a blister gas, and be allowed to form his own opinion of how to recognize them. He should have a large drop of blister gas liquid placed on his forearm, to be followed by personal decontamination, in order to give him confidence in gas ointment. He should be shown the appearance of blister gas liquid on detectors, clothing, equipment, and ground. (Sec. 28, para. 4.)
- iii. Given a short talk on enemy gas weapons (Sec. 19); and reminded of the efficacy of our protective equipment, provided it is used properly and kept in serviceable condition.
- iv. Shown the gas film. (Appendix B.)

4. Recruit syllabus.—The syllabus for the gas training of recruits is given as Appendix C. This syllabus should be taught at training centres.

5. Practice for trained men.—To maintain an efficient standard of gas training and gas discipline, the trained soldier should be:—

- i. Practised in the action to be taken on hearing the "rattle" or the shout of "gas" and the verbal warning "spray", by means of frequent test alarms by day and by night.
- ii. Tested periodically by means of tests of elementary training (Sec. 15).
- iii. Practised in carrying out normal duties and in sleeping with the face-piece adjusted, by day and by night, for periods leading up to four or five hours.
- iv. Given confidence in his respirator by a gas chamber test at least once in every three months (Sec. 17).
- v. Practised in recognizing the direction of the wind, since it is necessary to be "wind conscious" when gas is used.
- vi. Given further occasional short talks on enemy gas preparations, and our means of countering them.

3. Junior leaders

1. System of training.—Officers and N.C.Os. who have qualified at the Army Gas School should be employed to train the remaining junior leaders of the unit, including instructors at training centres.

2. Standard to be attained.—Junior officers and N.C.Os. should be trained:—

- i. As the gas instructors of their men.
- ii. To deal with the gas problems they will meet in the field.

3. Training as instructors.—Junior leaders should be trained to teach the ten initial lessons. (Sec. 2, para. 2.) A minimum of twenty 45-minute lesson periods is necessary for this part of the leader's training.

4. Further lessons for junior leaders.—Junior leaders should be taught the following further lessons:—

- i. Tests of elementary training. (Sec. 15).
- ii. Fitting of respirators. (Sec. 16.)
- iii. Gas chamber test (Sec. 17.)
- iv. Inspection of gas equipment. (Sec. 18.)

- v. Enemy gas weapons and gas intelligence. (Sec. 19.)
- vi. Effects of weather and ground on gas. (Sec. 20.)
- vii. Blister gases. (Sec. 21.)
- viii. Effects of gas on food and water; blister gas reconnaissance; and decontamination of ground. (Sec. 22.)

5. *Gas problems.*—Junior leaders should be given practice in dealing with gas problems introduced during outdoor exercises. For this purpose, the problems given in Secs. 29 to 40 may be useful as a guide. It is also important that junior leaders should:—

- i. Be reminded of the likely tactical employment of enemy gas weapons. (Sec. 19, paras. 9 and 10.)
- ii. Be given further practice in the recognition of blister gas on detectors, clothing, equipment, and ground. (Sec. 26, para. 1.)
- iii. Be given frequent practice in recognizing the direction of the wind.

6. *Syllabus.*—A syllabus for the gas training of junior leaders is given as Appendix D.

4. Gas officers and gas N.C.Os.

1. *Standard to be attained.*—The object of the gas officer and gas N.C.O. courses at the Army Gas School is to train selected officers and N.C.Os. of effective rank in the duties of unit gas officers and sub-unit gas N.C.Os. respectively. These duties comprise:—

- i. Training junior leaders as gas instructors of their men and teaching them how to deal with the gas problems they will meet in the field.
- ii. Inspecting gas equipment.
- iii. Fitting, disinfecting, and carrying out minor repairs to respirators.
- iv. Conducting gas chamber tests and giving instructions with actual war gases.
- v. Assisting their C.O. in the gas training of the unit as a whole, and in the gas protection of the unit in the field.

2. *Selection of students.*—Personnel chosen to receive the above specialist instruction at the Army Gas School should be carefully selected. Unless the officers and N.C.Os. sent to the School are above the average in intelligence and have already proved themselves to be instructors of ability, the unit as a whole will reap little benefit from them when they return from the course.

3. *Qualifying standards.*—Students who have attended gas officer and gas N.C.O. courses at the Army Gas School are graded as follows:—

- D. Distinguished.
- QI First class qualification.
- QII Second class qualification.
- F. Failed.

CHAPTER II—INITIAL LESSONS

5. War gases

1. *Instructor's note.*—Initial Lesson No. 1. This lesson should bring out the points in the following paragraphs, and should not go beyond them.

2. *Definition of a war gas.*—The term "war gas" is applied to any substance which is used in war for its poisonous, irritant, or blistering effects.

3. *Persistent and non-persistent gases.*—For military purposes, war gases are described as "persistent" or "non-persistent":—

- i. Persistent gases are liquids which evaporate slowly.
- ii. Non-persistent gases disperse quickly when released.

4. *Recognition.*—Some gases can be seen either as a cloud or as a liquid. Some can be smelt, but others can neither be seen nor smelt. Thus for safety, any feeling of choking, irritation of the nose or eyes, any suspicious smell, any suspicious liquid, or any hostile smoke, should be treated as a war gas until proved otherwise.

5. *Protection.*—The respirator affords complete protection to the eyes, nose, throat, and lungs against all war gases, provided, that it fits properly and is in serviceable condition.

6. *Classification of war gases.*—War gases are classified, according to their principal effects on the human body, into the following groups:—

- i. Choking gases.
- ii. Nose gases.
- iii. Tear gases.
- iv. Blister gases.

7. *Choking gases.*—These attack the breathing passages and the lungs, causing coughing and choking; they may cause death. The immediate adjustment of the respirator will prevent injury and give complete protection. Phosgene is the most effective of the choking gases. If the respirator is not adjusted immediately, a dangerous amount of phosgene may be breathed in, resulting in a feeling of suffocation accompanied by coughing. These symptoms may then cease, but if the lungs have been injured the symptoms may recur, often with serious results, at any time up to 24 hours.

8. *Nose gases.*—These cause sneezing, pain in the nose, throat, and chest, and aching of the teeth and head. Though causing much discomfort, nose gases are harassing only. The adjustment of the respirator will give complete protection, but the effects caused by the gas already inhaled will not subside immediately; it is important to keep the facepiece on, despite temptation to remove it. D.M. is an example of a nose gas.

9. *Tear gases.*—These cause a smarting of the eyes, and a flow of tears. They do not injure the eyes, unless liquid or solid gas enters them. The adjustment of the respirator gives immediate relief and complete protection. C.A.P. is a non-persistent tear gas. B.B.C. is an example of a persistent tear gas.

10. *Blister gases.*—The characteristics of this group of gases, of which mustard gas is an important example, are:—

- i. They are generally liquids giving off invisible vapours.
- ii. They are persistent.
- iii. They penetrate through clothing.
- iv. They attack the skin, as well as the eyes, nose, throat, and lungs.
- v. Both liquid and vapour are dangerous.

11. *Effects of blister gas liquid.*—The liquid effects are:—

- i. In the eye.—The smallest drop will usually cause permanent blindness in that eye. Immediate and thorough washing out with water may, however, save the sight.
- ii. Taken internally.—Causes severe internal injuries.
- iii. On the skin.—No immediate effect, but causes redness after a time and blisters may develop some hours later. Immediate treatment (later lesson) will prevent these effects.

12. Effects of blister gas vapour.—May cause no discomfort at first, but later effects are:—

- i. The eyes.—May cause closure of the eyes after some hours, with temporary blindness for one or two weeks. The timely adjustment of the respirator will prevent these effects.
- ii. The breathing passages and lungs.—May cause serious injury to both. The timely adjustment of the respirator will give complete protection.
- iii. The skin.—After a time, redness and irritation, which may be followed by numerous small blisters in some hours. (The protection of the skin against blister gases will be dealt with in later lessons.)

13. First-aid for war gases.—In addition to the immediate action already referred to:—

- i. *Choking gases.*—If respirator lost or damaged, put wet cloth over face. A man who is seriously affected by the gas should be made a stretcher case, kept warm, given warm sweet tea, no alcohol, no smoking, no artificial respiration, and transferred to nearest medical post.
- ii. *Nose gases.*—No special first aid treatment is necessary, and men affected should not be transferred to a medical post. Recovery is complete within an hour or two, even in bad cases.
- iii. *Tear gases.*—If tear gas liquid or solid has entered the eyes wash them out thoroughly with water. Only those men whose eyes have been seriously affected by actual tear gas liquid or solid entering them will be transferred to nearest medical post.
- iv. *Blister gases.*—If blister gas liquid has entered the eyes, after washing them out immediately and thoroughly with plenty of water, the man should then be transferred to the nearest medical post. Blister gas liquid on the skin should be swabbed off and ointment applied (later lesson). If blisters form they should not be pricked, but should be covered with a dressing. Men whose eyes or lungs have been injured by blister gas vapour should be transferred to nearest medical post.

14. Methods of releasing gas.—All war gases can be released from shells, bombs and other projectiles. In addition:—

- i. Nose and tear gases can be released from generators.
- ii. Blister gas can be sprayed from aircraft or applied directly to the ground.

15. Experience of war gases.—During later lessons, students will experience a tear gas and a nose gas in the gas chamber, and will be shown a choking gas and a blister gas in the gas compound.

16. Conclusion.—Remind students of the rule (when gas warfare has started) that any feeling of choking, irritation of the nose or eyes, any suspicious smell, any suspicious liquid, or any hostile smoke, should be treated as a war gas until proved otherwise.

6. Personal gas equipment

1. Instructor's note.—Initial Lesson No. 2. Stores required are one complete respirator, three eyeshields in carton, two pairs of sleeve detectors, four capes (one rolled in haversack, one rolled on belt, one rolled for attachment to body and one unrolled), two tins of ointment, two pots of ointment, one oz. of cotton waste, one wallet, and one light suit with gloves and valise. An assistant (i.e. one of the students) is required who, as each of the first six items (paras. 3 to 8) is mentioned, places it in the correct place on his person. Proceed as in the following paragraphs.

2. Individual responsibility.—Point out that every man is responsible for his own individual protection against gas; that he is provided with the necessary equipment for this purpose; and that he must, therefore, know how to use the equipment and keep it in serviceable condition.

3. Respirator.—Remind students that the respirator affords complete protection to the eyes, nose, throat and lungs against all war gases, provided it fits properly and is in serviceable condition. This item is dealt with in detail in the next lesson. (Sec. 7) and in Appendix "F."

4. Eyeshields.—The object of the eyeshield is to prevent liquid gas entering the eyes. Point out that:—

- i. It is worn with the felt pad in contact with the forehead. The press buttons should normally be fastened and the elastic band should not be adjusted too tightly. (Demonstrate this, students then copy.)
- ii. As the result of physical exertion in warm weather the eyeshield tends to dim and vision is restricted; under these conditions an officer may give permission for the press buttons to be left unfastened. (Demonstrate this, students then copy.)
- iii. Three eyeshields are issued to each man. One to be worn normally at all times when not under cover; the remainder to be kept in their carton in the front left-hand pocket of the respirator haversack.
- iv. Eyeshields should be handled with care and not discarded unless contaminated.

5. Sleeve detectors.—The purpose of sleeve detectors is to indicate to the man whether he has been hit with blister gas liquid. Point out that:—

- i. They are held in position on the upper arm by the shoulder strap which is passed through the tape loop.
- ii. Blister gas liquid will appear on the sleeve detectors as drops which may leave a brown or red mark.
- iii. One pair of sleeve detectors is issued to each man, to be worn normally at all times when not under cover.
- iv. N.C.Os. wear one detector only, on the left arm; badges of rank on the right arm thereby remain visible.
- v. Collective use is made of sleeve detectors, i.e., if any one detector among a group of men is hit, it must be assumed that all men in that group have been contaminated.

6. Cape.—The gas cape is provided to protect the body from blister gas liquid. Point out that:—

- i. The cape, when not in the worn position, can be carried in one of three rolled positions: i.e., attached, by means of the tapes to the nape of the neck or inside the equipment haversack or attached to the belt. (Show the rolled positions and then the worn position.)
- ii. To facilitate marching or work when the cape is in the worn position, the two corners can be folded back and secured by the two press buttons provided. (Demonstrate this.)
- iii. In the worn position, the cape will afford protection for about 90 minutes if no action is taken, but if free liquid contamination is swabbed off without delay it can be retained with reasonable safety until a clean one is available. A swabbed cape should always be retained until replaced by a clean one. (Sec. 11, para. 9, iii.)
- iv. One cape is issued to each man.
- v. The upper parts of both sleeves should be painted by the unit to act as sleeve detectors, the paint being renewed as necessary.
- vi. When not in use the cape should be unrolled and hung up by the two outer loops provided; if this is not done regularly the oiled fabric will become unserviceable. (Demonstrate method of hanging up the cape.)

7. *Ointment.*—The individual issue of gas ointment is used to prevent the effects of blister gas liquid on the skin; to protect the hands when handling a contaminated article (where gas gloves are not available or are too clumsy in use); to destroy blister gas liquid on personal weapons, clothing and equipment; and to protect the exposed skin against blister gas vapour. Point out that:—

- ii. i. Each man is issued with two pots or tins, each containing two ozs. of ointment. (Show how to take ointment from the pot or tube.)
- ii. The ointment must not be applied to the skin after redness has appeared, nor after the individual has left a vapour concentration. Ointment must not enter the eyes.
- iii. It should not be exposed to sources of heat, such as fires and hot pipes.
- iv. If in pots, the lids must be kept securely fastened but loosened periodically.
- v. To prevent the lids of the pots from sticking, a thin film of grease may be applied to the threads of the lid.
- vi. One pot or tin is carried in the front right-hand pocket of the respirator haversack; the other in the pocket of the cape.

8. *Cotton waste.*—The individual issue of cotton waste is for removing liquid contamination from the skin and from the chinstrap of the steel helmet, and for removing surplus ointment from the skin; it should not normally be used for other purposes. Point out that:—

- i. One oz. of cotton waste is issued to each man and should be broken up into small swabs. (Demonstrate this.)
- ii. One half of the cotton waste is carried in the front right-hand pocket of the respirator haversack and the other half in the cape pocket.
- iii. In each case about half the swabs should be placed below the ointment with the remainder on top ready for immediate use. (Demonstrate this.)

9. *Light suit.*—Show the suit, but the method of wearing it will not be demonstrated until Lesson 6. (Sec. 10.) The light gas suit is issued to certain personnel who either cannot carry out their duties efficiently in the gas cape, or who need the additional protection of the legs afforded by the suit. The suit consists of jacket and trousers, with the addition of three pairs of oilskin gloves or two pairs of rubber gloves. The suit gives protection against blister gas liquid for the same length of time as the gas cape; the instructions regarding swabbing also apply. The upper parts of both sleeves of the jacket should be painted by the unit to act as sleeve detectors, the paint being renewed as necessary. When not in use the suit should be hung up; if this is not done regularly the oiled fabric will soon become unserviceable. The light gas suit is issued, in addition to the cape, to the following:—

- i. One suit per A.F.V. (excluding carriers), in valise.
- ii. One per 4 signallers.
- iii. Two per cent. of unit for decontamination duties (minimum of 4 per unit).
- iv. All members of Bren carrier crews, who also get a valise each for the carriage of the suit. (Instructor to show the valise.)

10. *A/V battle dress*.—This dress is ordinary serge battle dress which has been specially treated to resist penetration by blister gas vapour. Point out that:—

- i. A/V battle dress affords no additional protection against blister gas liquid. (It gives no protection against lice.)
- ii. Each garment is marked on the inside with the letters "A/V".
- iii. When new, A/V battle dress has a characteristic smell which becomes less noticeable with wear.
- iv. Washing or dry cleaning of the suit destroys its gas resisting properties.
- v. If wet, the suit should not be dried close to a fire or in contact with hot pipes.

7. Description and care of respirator

1. *Instructor's note*.—Initial Lesson No. 3. Students should be seated at tables with their respirators in front of them. Stores required are complete respirators, (i.e., Mk. VI and VII haversacks), short and long tube respirators, a damaged facepiece and container, equipment cleaner, bowl of water, and a dry brush and wet brush for cleaning. Facepiece and container diagram showing air flow. Proceed as in the following paragraphs. For description of Light Respirator, see Appendix "F."

2. *Protection afforded*.—Remind students that the respirator affords complete protection to the eyes, nose, throat and lungs against all war gases, provided it fits properly and is in serviceable condition. Give warning that:—

- i. With nose gases the adjustment of the facepiece does not give immediate relief, and the wearer may temporarily feel worse; the wearer, however, must keep his facepiece adjusted despite temptation to remove it.
- ii. The respirator does not give protection against carbon monoxide which is present in coal gas and may sometimes be found in large bomb craters.

3. *Individual responsibility*.—Emphasize that:—

- i. The respirator is a personal issue to the soldier, who is responsible for maintaining it in serviceable condition.
- ii. The respirator is fitted for the soldier's own use and should not be lent to others.
- iii. The wearing of the respirator not only protects the soldier but enables him to continue fighting efficiently.

4. *Description*.—Name and demonstrate the parts of the respirator, explaining briefly how it works:—

- i. Facepiece.—Headharness, air channel, eyepieces, valve holder, connecting tube. (Becket and "S" hook on long tube.)
- ii. Container.—Inlet valve, inlet slots. Point out correct alignment of container with facepiece. (Sec. 18, para. 3.)
- iii. By use of diagram explain system of airflow through respirator.
- iv. Haversack.—Mark VI—sling, slides, cord loop, flatspring hooks, large Ds, or rings, small Ds, "S" hook, eyeletted tab, whipcord, two flaps, press buttons, five compartments. Mark VII—sling, slides, cord loop, rings, whipcord, whipcord button, single flap, press buttons, five compartments, pocket for anti-dimming outfit.
- v. Anti-dimming outfit.—Mark V—cylinder, cloth, composition. Mark VI—tin, specially treated cloth.

5. *Carriage in haversack.*—Demonstrate, giving detail, the method of carrying the container in the haversack and how the facepiece is returned to the haversack (students copying) as follows:—

- i. Place the container, with the inlet slots towards the centre, in the large right-hand pocket of the haversack.
- ii. Hold the facepiece in the right hand, allowing the headharness to fall inside, fold by pressing the eyepieces together and place in the large left-hand pocket of the haversack, the headharness towards the centre.

6. *Use of anti-dimming outfit.*—To ensure clear vision, it is necessary to treat the eyepieces with the anti-dimming compound or cloth. This should be done, normally, before returning the facepiece to the haversack after use. Under gas conditions, anti-dimming should be carried out at least once daily. Demonstrate and explain the methods, students copying, applying anti-dim to one eyepiece only:—

- i. Mark V.—Clean eyepiece with the cloth provided. Apply compound evenly with the finger. If it is too stiff to spread easily, breathe on the eyepiece to moisten it. Spread lightly over the eyepiece with the cloth. Do not polish. Breathe on the eyepiece until it becomes clear.
- ii. Mark VI.—Wet the finger tip and moisten the inner surface of the eyepiece. Rub vigorously with the cloth provided until the surface is clear and dry. (The cloth may also be used for the treatment of spectacle lenses and eyeshields.) When not in use, the lid of the tin must be kept closed.

7. *Adjustment of facepiece.*—At this stage it is necessary to teach students how to adjust the facepiece. The instructor will demonstrate and explain the following:—

- i. Hold the facepiece with the thumbs under the two middle and lower elastics.
- ii. Dig the chin in and bring the headharness over the head so that the centre elastics are approximately horizontal.

8. *Experience of anti-dimming treatment.*—To enable students to appreciate the value of the anti-dimming treatment, they should now adjust their facepieces in the manner taught. (It will be noted that only one eyepiece has been treated with the compound or cloth.)

9. *Removal of facepiece.*—Demonstrate and explain the method of removing the facepiece (students copying) as follows:—

- i. Insert two fingers of either hand between the facepiece and chin.
- ii. Remove the facepiece with an upward and outward movement.

10. *Care of respirator.*—Explain that the following must be avoided:—

- i. Complete respirator.—Keeping near hot pipes and fires.
- ii. Haversacks.—Using for the carriage of unauthorized articles.
- iii. Facepiece.—Stretching the elastics unduly; straining the buckles; tampering with the eyepieces; interfering with the outlet valve retaining nut; folding incorrectly.
- iv. Container.—Denting by rough usage; allowing water to enter.

11. *Cleaning of facepiece.*—Demonstrate and explain the correct method of cleaning the facepiece (students copying) as follows:—

- ii i. Without unduly stretching the elastics turn the head-harness over so that it rests against the front of the facepiece.

- ii. Wipe the inside with a cloth (e.g. handkerchief).
- iii. Treat eyepieces with anti-dimming compound or anti-dimming cloth.
- iv. If the facepiece and elastics are wet and muddy allow them to dry at normal temperature, and then brush off mud lightly while covering the outlet valve with the hand. Non-fabric covered facepieces should be wiped with a damp cloth.

12. *Cleaning of haversack.*—Explain the correct methods of cleaning the haversack:—

- i. If wet and muddy the haversack should be allowed to dry at ordinary temperature, and then brushed lightly.
- ii. The haversack should be cleaned with an equipment cleaner in powder form. (Demonstrate this.)
- iii. If the haversack is greasy it should be scrubbed with soap and warm water, and later reproofed by a thorough application of an equipment cleaner. No soda or scouring powders may be used, and the water must not be uncomfortably hot to the hand.

13. *Condensation inside facepiece.*—Explain that in hot weather some discomfort may be caused by the accumulation of condensed breath round the chin and inside the facepiece. This condition will increase, rather than diminish, the protection afforded by the facepiece, but the moisture can be removed by bending forward until the wearer is looking vertically downwards; the liquid can then be blown out through the outlet valve. (Instructor demonstrates this.)

8. Carriage of respirator

1. *Instructor's note.*—Initial Lesson No. 4. Follow the instructions given in Appendix E. The instructor should have respirator with short and long tubes and Mark VI and VII haversacks. Point out that the lesson deals with:—

- i. The method of carriage of the respirator from which protection can be most speedily gained, i.e. the "alert" position.
- ii. Alternative methods from which it will take longer to gain protection, but which are in certain circumstances less of a handicap to fighting efficiency, i.e. the "slung," "wading" and "carry" positions.
- iii. For carriage Light Respirator, see Appendix "F."

2. *Alert position (short tube).*—In this position the respirator is put on before all other items of equipment. Note:—

- i. Haversack well up on chest, flap next to body with press buttons unfastened, sling down back.
- ii. With Mark VI haversack, whipcord passed through right-hand small D, through sling at back and fastened tightly with slip knot to small D on left-hand side.
- iii. With Mark VII haversack, whipcord passed through sling at back and fastened tightly to whipcord button on right-hand side, making one and a half turns round button and securing with sharp pull.

3. *Alert position (long tube).*—In this position the respirator is put on after all other items of equipment. Note:—

- i. Sling over right shoulder and haversack at left side.
- ii. Haversack flap next to body with press buttons unfastened.
- iii. Whipcord fastened round body, using small Ds or whipcord button, to hold haversack steady.

4. Slung position (short or long tube).—In this position the respirator is put on after all other items of equipment. Note:—

- i. Sling over right shoulder, above shoulder strap of tunic.
- ii. Haversack at left rear, just below belt.
- iii. Flap next to body with press buttons fastened, whipcord passed around the waist to keep haversack steady.

5. Wading position (short or long tube).—In this position the respirator is put on after all other items of equipment. Object is to keep the haversack above water level when wading in deep water. Note:—

- i. Haversack at back of neck, flap next to body with press buttons fastened.
- ii. Sling brought over head and unbuckled belt passed through it.
- iii. Belt rebuckled and sling shortened so that respirator is held steady.

6. Carry position (short tube).—In this position the respirator is put on after all other items of equipment. The position cannot be adopted when an equipment haversack or pack is worn on the back. Note:—

- i. Sling reduced to shortest extent.
- ii. With Mark VI haversack, whipcord passed through right-hand small D.
- iii. With Mark VII haversack, whipcord given one turn round the whipcord button.
- iv. Sling over right shoulder, haversack on back, flap next to body with press buttons fastened.
- v. Whipcord brought round right side of body and secured to whipcord loop with quick release bow.

7. Explain the conditions of the Inspection Tests in relation to this lesson.

9. Respirator drill

1. Instructor's note.—Initial Lesson No. 5. Follow the instructions given in Appendix E. The instructor should have respirators with short and long tubes and Mark VI and VII haversacks. Point out that:—

i. The lesson deals with the adjustment of the facepiece in order to gain protection against gas, and with the method of testing for gas.

ii. Provided both hands are free, it is possible to adjust the facepiece from an "alert" position without halting; individuals will be trained to do this. As a general rule, however, the adjustment of the facepiece should be done at the halt; this is obviously necessary when carrying weapons or other loads, and when moving across rough ground.

iii. When protection is required, STOP BREATHING UNTIL FACE-PIECE IS ADJUSTED.

2. From alert positions.—Sequence:—

- i. Stop breathing.
- ii. Place steel helmet to back of head.
- iii. Withdraw facepiece quickly from haversack.
- iv. Remove eyeshield and place in haversack.
- v. Hold facepiece with thumbs under the two middle and lower elastics.
- vi. Dig chin in and bring headharness over head so that centre elastics are approximately horizontal.
- vii. Remove any folds in facepiece or twists in headharness.
- viii. Breathe out hard, to clear gas from inside facepiece.
- ix. Replace steel helmet and adjust chinstrap.
- x. Steady long tube by attaching S hook (which is on becket of tube) to any convenient part of equipment or buttonhole of clothing.

8. From slung position.—Sequence:—

- i. Stop breathing.
- ii. Bring haversack to front of body.
- iii. Unfasten press buttons with sharp pull.
- iv. Obtain protection as already taught (para. 2 above).
- v. With short tube and Mark VI haversack shorten sling by engaging brass "S" hook in eyeletted canvas tab on sling, and pass whipcord around body, securing to "D." With Mark VII haversack shorten sling by means of sliding bars and secure whipcord around body, fasten round whipcord button.
- vi. With long tube it will be unnecessary to bring the haversack to the front of the body. Merely gain protection as already taught.

4. From wading position.—Sequence:—

- i. Stop breathing.
- ii. Unbuckle belt to release sling.
- iii. Bring haversack to front of body.
- iv. Unfasten press buttons with sharp pull.
- v. Obtain protection as already taught (para. 2 above).
- vi. Rebuckle belt.
- vii. With short tube and Mark VI haversack, fasten S hook and eyeletted tab together, and secure haversack by passing whipcord round body, using small Ds.
- viii. With short tube and Mark VII haversack, reduce sling to shortest extent, and secure haversack by passing whipcord round body, using whipcord button.
- ix. With long tube, adjust haversack in alert position.

5. From carry position.—Sequence:—

- i. Stop breathing.
- ii. Release whipcord.
- iii. Bring haversack over right shoulder to front of body.
- iv. Unfasten press buttons with sharp pull.
- v. Obtain protection as already taught (para. 2 above).
- vi. Secure haversack by passing whipcord round body, using small Ds or whipcord button.

6. Standard test.—Inform students that in the gas tests of elementary training the standard time for the adjustment of facepiece from any position in which the respirator is carried is 15 seconds. Point out that within this time limit accuracy is more important than extreme speed, provided that breathing is stopped throughout the process of adjusting the facepiece. The time limit of 15 seconds does not include the replacement of the steel helmet or (where necessary) the subsequent adjustment of the respirator haversack. (Sec. 15, paras. 10 to 12.)

7. Test for gas.—At all times before removing the facepiece each individual must test for gas to satisfy himself that no gas is present. This will always be done on hearing the words "gas clear." Sequence:—

- i. Take a deep breath (to fill lungs with pure air).
- ii. Insert two fingers of either hand between facepiece and cheek.
- iii. Sniff gently (with back to the wind).
- iv. If gas present, withdraw fingers and breathe out hard (to clear gas from inside facepiece).

10. Gas cape and light gas suit

1. Instructor's note.—Initial Lesson No. 6. This lesson deals with the worn and rolled positions of the cape, and the worn position of the light suit. Students should form a semi-circle facing the instructor as for respirator drill. Each student requires battle order, a light gas suit with one pair of gas gloves, and a pair of rubber knee boots. Instructor checks that cotton waste and ointment are in cape pocket (ointment to be flat in pocket; this assists in the rolling of the cape). Remind students that the cape can be put on in the worn position or carried in one of three rolled positions. The light suit is issued to certain personnel only (Sec. 6, para. 10).

2. Worn position of cape.—Demonstrate the worn position of the cape pointing out that the use of the tapes may be dispensed with and reminding students that the corners of the cape can be fastened back to facilitate marching or work. Point out also that there may be occasions, e.g. after a shower of rain, when it is convenient to unbutton the cape from the worn position and allow it to hang down the back; this is not a normal position in which to carry the cape, but when adopted the tapes must be used. Demonstrate the use of the tapes as follows, students copying:—

- i. Bring the tapes over the shoulders.
- ii. Pass the tapes under the arms and cross them behind the back.
- iii. Bring the tapes to the front of the body and tie them in a bow.

3. Rolling of cape.—Demonstrate the following method of rolling the cape, for carriage either in the haversack, on the belt or on the body:—

- i. Lay the cape on the ground, inside uppermost. (For carriage in the haversack, place tapes inside the cape; for attachment to the belt or the body place tapes clear of the cape.)
- ii. Fold right-hand edge to centre.
- iii. Fold left-hand edge to new right-hand edge, at the bottom.
- iv. Fold in sleeves.
- v. Repeat ii and iii. The width of the cape should then be about 11 inches.
- vi. For carriage in the haversack, roll the cape from the neck. Stop approximately 18 inches short of the bottom and double this portion back on itself twice.
- vii. For carriage on the belt or on the body, roll the cape from the bottom.
- viii. For carriage on the body secure the cape by means of the whipcord keeping the loop always pointing down from the cape collar. Tie with a double quick release bow.

4. Rolled position of cape inside haversack.—Demonstrate and explain method of rolling the cape for carriage inside the haversack, students copying. Place the rolled cape in the haversack, the doubled portion (para. 3, vi, above) being under the haversack flap and straps; students copy. Point out that:—

- i. The cape is carried in the equipment haversack either in place of the waterbottle, which should then be worn on the right side, or of the ground sheet if room can be found for this item in unit transport.
- ii. The cape is placed in the haversack on top of all other items.

5. Rolled position of cape on belt.—Demonstrate and explain method of rolling the cape for carriage on the belt, students copying. Demonstrate and explain, students copying, the following method of attaching the rolled cape to the belt:—

- i. Before putting on the equipment, place the rolled cape centrally on the belt, collar outside and pointing downwards, tapes clear.

- ii. Bind cape to the belt by means of the tapes, using their full length, winding them in opposite directions so that their ends may be tied together.

6. *Rolled position on the body.*—Demonstrate and explain method of rolling the cape for carriage on the body, students copying. Demonstrate and explain, students copying, the following method of attaching the rolled cape to the body:—

Place the rolled cape on the back of the neck and secure by means of the tapes as in para. 2, sub-paras. i, ii and iii (worn position).

Demonstrate and explain, students copying, the method of obtaining protection (worn position), i.e. by pulling the quick release cord and buttoning up the cape.

Explain the conditions of the Inspection Test in relation to this lesson.

7. *Light gas suit.*—Remove battle order. Proceed as follows, demonstrating and explaining, students copying:—

- i. Put on trousers and secure at waist by tying whipcord in a bow.
- ii. Put on boots (or over-boots).
- iii. Put on jacket. Pass the tape, which is found attached to the inside of the right-hand panel, through the eyelet found on the left-hand edge of the jacket.
- iv. By means of the tape, pull eyelet to point where tape is fixed to the jacket, and secure by means of a half-bow.
- v. Fasten press buttons.
- vi. Adjust respirator to the alert position. (Point out that the respirator is adjusted outside because the jacket is double breasted and therefore, if adjusted inside, it would be impossible to withdraw the facepiece without first undoing the jacket. Point out also that if equipment is worn, it will be worn outside the jacket.)
- vii. Adjust gas gloves. The jacket sleeves are tucked inside the gauntlets. With the oilskin pattern gloves, the gauntlets are tightened by means of the quick-release fasteners.

Note.—In heavy vapour concentration the jacket may be worn inside the trousers and the trousers inside the rubber boots.

11. Personal decontamination

1. *Instructor's note.*—Initial Lesson No. 7. At least two periods are required to teach this lesson; the first period for Part I (paras. 2 to 5); the second for Part II (paras. 6 to 10). Respirators and steel helmets are required for the first period; battle order to be worn for the second period. For training purposes, actual ointment should not normally be used more than once a week. During training, cotton waste and eyeshields should be retrieved at the end of the lesson. Students form a semi-circle in front of the instructor. Check contents of respirator haversacks and cape pockets. Point out that:—

- i. Blister gas liquid on the skin causes blisters of a serious nature unless action is taken quickly. On clothing it causes blisters underneath unless action is taken within 10 minutes or so.
- ii. The action which will prevent blisters is personal decontamination. Every individual must be able to do this.

2. *Sequence of personal decontamination.*—Point out that there is a definite sequence for personal decontamination which can be memorized by the letters COECDO:—

C stands for cotton waste.

O stands for ointment.

E stands for eyeshield.

C stands for clothing and equipment.

D stands for detectors and weapons.

O stands for ointment.

3. Division into two parts.—Point out that personal decontamination is divided into two parts. Part I—COE. Part II—CDO. Explain that:—

- i. In order to prevent blisters forming on the exposed skin, Part I has to be carried out without delay. It can be done on the move, if necessary, provided both hands are free. Part I occupies about five minutes.
- ii. The timely carrying out of Part II prevents blistering under clothing. It also allows for the decontamination of weapons. It is done at the halt, under the control of the commander on the spot, and occupies about 15 minutes.

4. Personal decontamination, Part I.—Proceed as follows, demonstrating each item with detail. This will be followed by students practising Part I, first at the halt until proficient and then on the move, the instructor correcting faults:—

- i. **C** for cotton waste.—By swabbing with cotton waste, remove all free liquid from the exposed skin and from the chinstrap of the steel helmet.
- ii. **O** for ointment.—Rub gas ointment vigorously into the exposed parts of the skin, using both hands, for not less than 30 seconds for each part, and alternating between face, neck and each hand (and knees, if bare). This will take about two minutes. If the ointment vanishes before the rubbing is complete more ointment should be taken. Ointment must not enter the eyes. After the rubbing is complete, surplus ointment (if any) should be removed (except from the hands). Smear more ointment on the hands, leaving a visible film.
- iii. **E.** for eyeshield.—Prepare a fresh eyeshield for use and substitute for old one. Inspect the latter and discard if contaminated.

5 Points to note.—Bring out the following points:—

- i. Swabbing of the exposed skin should be carried out speedily as it is important to get ointment into the skin without delay.
- ii. The blister gas liquid which has penetrated into the skin will not be destroyed unless the rubbing in of the ointment is done really vigorously.
- iii. When Part I is carried out at the halt, contaminated cotton waste and eyeshields should normally be collected and either burned or buried.

6. Personal decontamination, Part II.—Point out that:—

- i. During Part I the commander on the spot will, if possible, be leading his men to clean ground (or to cover if available) where he will order Part II to be carried out.
- ii. The personal issue of cotton waste should normally be used only for the skin and for the chinstrap of the steel helmet; other material, e.g. grass, leaves, dry earth or sand, being used for swabbing boots, capes, equipment and weapons.
- iii. When swabbing boots, particular attention should be paid to seams.
- iv. Care will be taken to place weapons and equipment on clean ground.

7. Part II—Cape rolled.—Proceed as follows, demonstrating each item with detail, students copying:—

- ii **i. C for clothing and equipment.**—Remove equipment, tunic and helmet. Swab boots. Remove anklets. Examine trousers and tunic, apply ointment to both sides of the material wherever contamination is detected or suspected, and apply ointment to the skin (where not covered by underclothing) underneath the contaminated parts. Put on tunic. (Note.—If there is doubt as to whether any contamination on the tunic has not been detected and treated owing to extent of contamination, bad light, grease, dirt or rain, the tunic must be discarded and the jersey worn until a fresh tunic is available. On occasions, the commander on the spot may consider it advisable to order all tunics to be discarded.) Examine anklets and equipment, swab off any free liquid and apply ointment to both sides of the material wherever contamination is detected or suspected. Put on anklets and equipment. Remove garnish from steel helmet; swab helmet; apply ointment to both sides of chinstrap where contaminated; regarnish helmet if necessary. Put on helmet.
- iii. D for detectors and weapons.**—Swab sleeve detectors and retain them for further use, but if contaminated with a large number of drops they should be discarded and the spare pair taken into use. Decontaminate weapons (taught in next lesson—Sec. 12).
- iiii. O for ointment.**—Swab the hands with clean cotton waste and rub fresh ointment vigorously into each hand for 30 seconds.

8. Part II—Cape worn.—Proceed as follows, demonstrating each item with detail, students copying:—

- i. C for clothing and equipment.**—Remove cape and helmet. Swab boots. Remove anklets. Examine lower portions of the trousers, apply ointment to both sides of the material wherever contamination is detected or suspected, and apply ointment to the skin (where not covered by underclothing) underneath the contaminated parts. Examine anklets, swab off any free liquid and apply ointment to both sides of the material wherever contamination is detected or suspected. Put on anklets. Swab cape and put it on again. Remove garnish from steel helmets; swab helmet; apply ointment to both sides of chinstrap where contaminated; regarnish helmet if necessary. Put on helmet.
- ii. D for detectors and weapons.**—Ensure that all drops of liquid on detector paint or cape sleeves have been swabbed dry (any later contamination will be oily and easily recognizable). Decontaminate weapons (taught in next lesson—Sec. 12).
- iiii. O for ointment.**—Swab the hands with clean cotton waste and rub fresh ointment vigorously into each hand for 30 seconds.

9. Further points to note.—Bring out the following further points:—

- i. When Part II of personal decontamination has been completed,** contaminated cotton waste and other swabs should normally be collected and either burned or buried.
- ii. As an alternative to the removal of the cape (when in the worn position)** for the purpose of swabbing it, the cape may be left on and swabbing carried out by individuals working in pairs, each swabbing the other's cape.
- iii. Although the early swabbing of the cape will extend considerably its** protective life, some of the liquid will have been absorbed into the oiled fabric. The cape must, therefore, eventually be completely decontaminated to render it perfectly safe. Nevertheless, the cape

should be retained (but not brought into a room or other confined space) until it has been replaced by a fresh one.

- iv. The risk from the continued wearing of contaminated boots increases the longer the liquid remains on them; the necessity for the early swabbing of the boots is therefore apparent. If boots have been well dubbined, and if any liquid contamination is swabbed off within five minutes or so, the continued wearing of the boots is not likely to occasion injury.
- v. Blister gas liquid (even light contamination) is a source of vapour danger. If taken into a confined space where vapour can accumulate, injuries may be caused to any men present. Therefore, an individual who, for any reason, has not carried out personal decontamination thoroughly, must not remain for more than a few minutes in a room or other confined space without removing his outer clothing (including boots) and leaving it outside.
- vi. The appearance of drops of blister gas liquid on the cape, sleeve detectors, dubbined boots, clothing and equipment, will be demonstrated when students visit the gas compound. (Sec. 26, para. 1, vi.)

10. Standard test.—Inform students that personal decontamination is included in the gas tests of elementary training as one of the standard tests. While the whole operation will take about 20 minutes (including decontamination of personal weapons), there is no standard time for the test; the individual is tested in his ability to carry out accurately and thoroughly the whole process of personal decontamination. (Sec. 15, paras. 10 to 12.)

12. Decontamination of weapons and vehicles

1. Instructor's note.—Initial Lesson No. 8. The preliminary arrangements and stores necessary are:—

- i. Weapons.—Rifles are required by instructor and students. Suitable swabs, other than cotton waste, to be at hand. Some blister gas training mixture.
- ii. Vehicles.—Requirements are a truck with driver, with gas gloves at hand, some blister gas training mixture, and the following stores and equipment on the vehicle:—2-gallon tin of petrol (water for instructional purposes), 2-gallon tin of water, 7-lb. or 2-lb. tin of bleach (dry sand may be used to simulate bleach during training) g.s. shovel, 4-oz. tin of detector paint, paint brush and sand-bags or rags.

2. Decontamination of rifle.—Point out that all ranks are responsible for the decontamination of the weapons on their charge, that the decontamination of the rifle will be taught and that the same principles apply to all weapons. Proceed as follows, demonstrating and explaining:—

- i. Rub gas ointment into the hands, leaving a visible film on the hands to give protection when handling contaminated articles. (This will have been done during personal decontamination Part I.)
- ii. Unless the sling is heavily contaminated it should be left on the rifle, all free liquid being removed with a swab. Rub ointment into both sides of the affected parts of the sling.
- iii. Remove, by careful swabbing, all free liquid from the rifle. Apply ointment to all contaminated parts, rubbing it well into the woodwork.
- iv. Remove ointment from the metal parts of the rifle with a swab, and re-oil. Do not remove ointment from the woodwork.

- v. Wipe off surplus ointment from the hands with cotton waste and then rub more ointment vigorously into each hand for 30 seconds. (This is done at the end of personal decontamination Part II.)

3. Practice.—Students practise decontamination of their rifles, the instructor having first applied a number of drops of the training mixture to represent blister gas contamination. The instructor gives the detail and corrects faults as necessary.

Note.—Part II of personal decontamination will now be practised.

4. Decontamination of guns.—The following further details relate to decontamination of these larger weapons:—

- i. Remove rubber eyepiece. Replace with fresh one if available, taking care that it is not contaminated in so doing.
- ii. Remove such parts as padded seat covers.
- iii. Swab metal parts with which contact is likely, using a sandbag or ram moistened with petrol or paraffin.
- iv. Remove visible contamination from non-metallic parts with which contact is likely, using dry swabs, and then apply ointment if available. (Note that dubbin on the leather parts renders the removal of blister gas liquid much easier.)

5. General points.—Bring out that:—

- i. The personal issue of cotton waste should not normally be used re the decontamination of weapons.
- ii. The personal issue of ointment may be used for the decontamination of personal weapons.
- iii. For anti-tank rifles, all types of machine guns and the 2-in. and 3-in. mortars, there is a special issue of 8 ozs. of ointment per weapon.

6. Decontamination of vehicle.—Point out that:—

- i. All drivers are responsible for the decontamination of their vehicle.
- ii. Blister gas itself will not prevent a vehicle being driven.
- iii. If the driver has been contaminated, his first action will be personal decontamination.
- iv. Decontamination of the vehicle should be carried out at the first opportunity. It is important to attend first to those parts with which personnel or stores are likely to come in contact.

7. Light contamination.—Point out that, in the case of spray or similar light contamination:—

- i. The swabbing of those portions of the vehicle which the driver & other personnel are likely to touch (e.g. steering wheel, controls, starting handle, door handle, tailboard) will generally suffice.
- ii. The patch of detector paint should be swabbed and, at the first opportunity when the engine is cool, repainted with the paint carried on the vehicle. (If a brush is not available the paint can be applied with a rag.)

8. Heavy contamination.—Point out that in the case of heavy contamination such as may be caused by the nearby burst of a projectile, some or all of the actions enumerated below will be taken, depending on the military situation. To teach these actions the instructor will apply a small quantity of the blister gas training mixture to a portion of the woodwork (e.g. tailboard), mudguard, hood and tyre of the vehicle. The driver will then examine his vehicle, locate the contamination, remove his decontamination stores from the vehicle, put on his gloves and proceed to decontaminate the vehicle as follows:—

- i. Deal first with the woodwork, swabbing off the free liquid using a sandbag or rag moistened with petrol. Mix on the shovel a small quantity of bleach paste to a thick creamy consistency and apply it to the affected portions by means of a sandbag or rag.
- ii. Deal next with the mudguard, swabbing off the free liquid using a sandbag or rag moistened with petrol. No bleach paste on metal parts.
- iii. Free liquid (if any) on the hood and tyre should be swabbed off, using a sandbag or rag moistened with petrol, the remainder being left to weather.
- iv. If the seats are contaminated they should be swabbed and then either turned upside down or covered with a cape.
- v. Finally, burn or bury the used swabs.

13. Blister gas detectors and gas warning signs

1. *Instructor's note.*—Initial Lesson No. 9. The stores required are a smooth board or metal sheet about 18 ins. by 18 ins. painted with detector paint (for use as a spray detector), a tin of detector paint, a pad of ground detector paper, three gas warning signs, and detectors spray (old pattern) and detector tray for forward control vehicles.

2. *Spray detectors.*—Explain that:—

- i. The object of a spray detector is to indicate that blister gas spray has fallen.
- ii. Blister gas spray will appear on the detector paint as oily drops which may leave a brown or red mark.
- iii. Spray detectors are used in camps and bivouacs. They are put out in the open about 200 yds. apart in irregular lines.
- iv. An older pattern of spray detector consists of nine metal frames (each 6 ins. by 6 ins.) with slits at the corners for the insertion of detector paper. The nine frames are laid out to form an 18 in. square. When stocks of these frames are exhausted they will be replaced by single metal sheets (each 18 ins. by 18 ins.) to be painted with detector paint by the unit.

3. *Detector paint on vehicles.*—The detector paint is applied to the bonnet in an irregular shape. It should cover an area equivalent to about 18 ins. by 18 ins. and must be visible to the driver. (Forward control vehicles are provided with a special tray, to be treated with detector paint.)

4. *Ground detectors.*—Explain that:—

- i. The object of ground detectors is to confirm the senses of sight and smell when detecting blister gas liquid on the ground.
- ii. The ground detector is used on a bayonet or stick and pressed on the suspected area for at least 10 seconds. After a further 30 seconds wipe off any dirt and also the liquid, under which a red stain will be seen on the paper if contaminated.
- iii. Ground detectors are issued in pads of 25 sheets, one pad to each officer, warrant officer and N.C.O.

5. *Detection of liquid only.*—Emphasise that detector paint and ground detectors (as well as sleeve detectors) are for the detection of blister gas liquid and not vapour.

6. Gas warning signs.—Explain that:—

- i. The object of gas warning signs is to give warning of the presence and extent of contaminated ground left to weather, and to mark dumps of contaminated stores and material.
- ii. They are small triangular metal sheets, yellow on one side and white on the other, bearing the word "gas" in black letters on both sides.
- iii. When marking contaminated ground, gas warning signs should be placed or hung about 20 yds. from the edge of the contamination with the yellow side towards the contamination.
- iv. They should always be marked with the time and date when placed in position.

7. Demonstrations.—Inform students that the appearance of blister gas on detector paint and ground detectors will be demonstrated when they visit the gas compound. (Sec. 26, para. 1, vi.) Demonstrate and allow students to practice the following:—

- i. The lay-out of spray detectors.
- ii. How to use ground detectors.
- iii. How to use gas warning signs.

14. Gas alarm system and gas duties of sentries

1. Instructor's note.—Initial Lesson No. 10. Students should wear battle order with eyeshields adjusted. The stores required are a gas rattle, spray detectors and an electric torch. Point out that:—

- i. The responsibility for protecting himself against gas lies on the individual.
- ii. As a collective measure of protection, however, certain gas alarms are in force. The correct use of these alarms will depend on sentries being thoroughly trained in their gas duties.
- iii. There are two gas alarms, each one requiring a different action. They are the rattle or shout of "gas," and the verbal warning "spray."

2. Gas rattle or shout of "gas."—Show and sound the rattle and point out that when no rattle is available the shout of "gas" will be used instead. Explain that:—

- i. The warning is given when the immediate action required is the adjustment of the respirator facepiece. Therefore, the rattle or shout of "gas" denotes the presence of any gas other than blister gas spray.
- ii. Every individual hearing the rattle or shout of "gas" will immediately stop breathing, adjust the facepiece and continue work.
- iii. Blister gas from ground burst missiles endangers, initially, the eyes and breathing passages. This is due to the shattering of a portion of the liquid gas into a fine mist which is dangerous. The immediate adjustment of the respirator facepiece is necessary if serious injury is to be prevented. The gas alarms in this case are, therefore, the sounding of the rattle or the shout of "gas." Subsequently, personal decontamination by those individuals contaminated by the liquid will be necessary to minimize casualties resulting from skin injury, and should be carried out with the minimum of delay.

3. Removal of the facepiece.—Explain that when the commander on the spot is satisfied that there is no longer any necessity to continue wearing the facepiece, he will cause the words "gas clear" to be passed by word of mouth; all ranks will then test for gas and, if satisfied that gas is clear in their area, they will remove their facepieces and pass on the words "gas clear."

4. *Practice.*—Practise students in the action to be taken on hearing the gas rattle or the shout of "gas," and on hearing the words "gas clear."

5. *Verbal warning "spray."*—Point out that the other method of giving warning of the presence of gas is the verbal warning "spray." Explain that:—

i. This warning is given when the immediate action required is Part I of personal decontamination. Therefore, the verbal warning "spray" denotes that blister gas spray has fallen.

ii. Blister gas released from containers carried by aircraft, or by means of air burst missiles (e.g. air burst bombs and air burst shell), is classified as spray. From this form of attack there is no danger to the breathing passages and therefore the respirator plays no part in protection against it, but personal decontamination is necessary to minimize casualties among individuals contaminated by drops of this spray. The gas alarm in both these cases is, therefore, the verbal warning "spray."

iii. Every individual in the open who hears the verbal warning "spray" will immediately carry out Part I of personal decontamination.

6. *Practice.*—Practise students in the action to be taken on hearing the verbal warning "spray."

7. *Other warnings.*—Point out that overseas and in certain other areas a siren or horn may be used to denote the approach of a gas cloud. The siren or horn demands instant alertness for gas. The rattle will be sounded or the shout of "gas" given immediately the presence of gas is recognized.

8. *Sentries.*—Explain that special gas sentries are not provided and that the duties of every sentry include the ability to recognize the presence of gas and to give the appropriate gas alarm. A sentry must therefore be provided with a gas rattle, and (by night) a torch for the examination of spray detectors.

9. *Gas duties of sentries, other than for spray.*—Explain that gas other than spray may be recognized by the senses of sight or smell (i.e. any suspicious liquid or hostile smoke, or any suspicious smell), or by the initial effects on the body (i.e. any feeling of choking or irritation of the nose or eyes). Demonstrate, employing one of the students, and explain the following action to be taken by a sentry on recognizing any form of gas attack other than spray:—

- i. Stop breathing.
- ii. Sound the rattle.
- iii. Adjust facepiece.
- iv. Sound the rattle again, this time for at least 30 seconds.

10. *Gas duties of sentries, hostile smoke.*—Point out that gas may be used under cover of smoke; it is therefore necessary for hostile smoke to be treated as war gas until it is proved otherwise. In the presence of hostile smoke, or when a hostile smoke cloud is about to envelop him, the sentry will act as in para. 9 above. (When inside the cloud, the commander on the spot will give "gas clear" if he is satisfied that gas is not present, or that the smoke will not cause distress. Some screening smokes may be sufficiently irritant to make the wearing of respirators useful.)

11. *Gas duties of sentries, for spray.*—Remind students of the purpose of spray detectors and point out that in order to ascertain if spray has fallen and to be able to give timely warning, a sentry must visit each detector for which he is responsible at intervals of not more than 10 minutes. Demonstrate, employ-

ing one of the students, and explain the following action to be taken by a sentry on noticing that spray has fallen:—

- i. Shout "spray."
- ii. Carry out Part I of personal decontamination.
- iii. Warn the guard commander, who will arrange for spray detectors to be swabbed or renewed.
- iv. On relief (the guard commander should arrange this as soon as possible) carry out Part II of personal decontamination.

12. *Gas alarms when troops are at rest.*—Emphasise that troops at rest are highly vulnerable to gas attacks. It is the normal practice to post double sentries at night, and also by day when troops are sleeping. Point out that:—

- i. In the case of gases other than spray.—The rattle may not wake heavily sleeping troops. One of the two sentries on each post must therefore enter billets, bivouacs or shelters and rouse troops as quickly as possible. Speed in the adjustment of respirator facepieces is essential when a choking gas has been used.
- ii. In the case of spray.—When sleeping troops are under cover it will be unnecessary to take special steps to rouse them when spray has fallen provided the standing order that helmets, eyeshields, capes and boots are worn when leaving cover for any purpose, is enforced; the sentry will, however, give the verbal warning "spray" in order to warn any individuals who may be about in the open.

13. *Gas alarms, restricted use.*—Point out that although all ranks must immediately take the appropriate action on hearing the sound of a rattle or the verbal warning "spray," a sentry will not immediately sound his own rattle and adjust his facepiece, or repeat the verbal warning "spray." He should be at once alert for gas and will sound his rattle or give the verbal warning "spray" when he recognizes the presence of gas. Failure to observe this rule may result in the unnecessary adjustment of facepieces by troops in an area of considerable extent, even though gas may be present in only a small part of that area. Consideration of wind direction may save much unnecessary disturbance to rest.

CHAPTER III—FURTHER LESSONS FOR JUNIOR LEADERS

15. Tests of elementary training

1. *Instructor's note.*—Junior Leader Lesson No. 1. Students require battle order, and should form up in two ranks facing inwards. A list of oral test questions and a watch with a second hand are required. Proceed as in the following paragraphs.

2. *Objects of tests.*—Explain that the objects of tests of elementary training are as follows:—

- i. To ensure that individuals have reached an efficient standard.
- ii. To ensure that trained soldiers retain their efficiency.
- iii. To prevent any detail of elementary training being overlooked, while avoiding unnecessary repetition.
- iv. To enable officers charged with the preparation of individual training programmes to see in which subjects further instruction is required, and therefore to make the best use of the time available.

3. *Testing.*—Remind students of the importance of not confusing teaching with testing. In the former the men are instructed by explanation and demonstration followed by execution, while in the latter, men are questioned or ordered to carry out a certain test without any demonstration or assistance. They must then pass or be put back for further instruction. The conditions of each test will be explained to individuals before it is carried out.

4. Tests.—Explain that the tests are divided into:—

- i. Oral tests, when the men are asked simple direct questions, the answer to which should be more than "yes" or "no."
- ii. Inspection tests, when the men are tested in the carriage of the respirator and cape, and in testing for gas.
- iii. Standard tests, when the men are tested in their ability to gain protection against gas.

5. Further procedure.—Inform students that the rest of the lesson period will be devoted to teaching them how to conduct gas tests of elementary training.

6. Oral tests.—Demonstrate the conduct of oral tests by asking individual students in one rank questions on the undermentioned subjects. Follow this by asking individual students in the other rank whether they consider the questions were answered correctly:—

- i. War gases (Sec. 5).
- ii. Use and care of items of personal gas equipment, other than the respirator (Sec. 6).
- iii. Care and cleaning of the respirator, including anti-dimming (Sec. 7).
- iv. Gas alarms system and gas duties of sentries (Sec. 14).

7. Note on oral tests.—Point out that the qualifying standard is that three out of four questions should be answered correctly.

8. Inspection tests.—Battle order will be worn when carrying out these tests. Demonstrate the conduct of inspection tests by calling upon individual students in one rank to perform the following actions. Follow this by asking individual students in the other rank whether they consider the actions were performed correctly:—

- i. Place the respirator in a carriage position, the actual position required to be ordered by the examiner. (Sec. 8.)
- ii. Test for gas. (Sec. 9, para. 7.)
- iii. Place the cape in a rolled position, the actual position required to be ordered by the examiner. (Sec. 10, paras. 4 and 5.)

9. Note on inspection tests.—Point out that any man who makes serious mistakes in the above three tests will fail.

10. Standard tests.—Battle order will be worn when carrying out these tests. Emphasise the importance of the standard tests, since they are designed to ascertain the ability of the individual to avoid becoming a gas casualty. Point out that accuracy is more important than extreme speed, provided that breathing is stopped throughout the process of adjusting the facepiece. Demonstrate the conduct of standard tests by calling upon individual students in one rank to take action on hearing the following gas alarms. Follow this by asking individual students in the other rank whether they consider the actions taken would, in fact, have prevented the individual from becoming a gas casualty:—

- i. The rattle or shout of "gas" (the student will have placed his respirator in an alert, slung, or carry position as ordered by the examiner, and adopted the prone position armed with a rifle.) The accurate adjustment of the facepiece from any position (alert, slung, or carry) must be effected within 15 seconds. This time limit does not include the replacement of the steel helmet or (where necessary) the subsequent adjustment of the respirator haversack. When the wading position has been ordered, the test will be conducted in the standing position.

- ii. The verbal warning "spray" (the cape will be in the worn position or in a rolled position as ordered by the examiner). Part I of personal decontamination will occupy about five minutes. Part II will take about 15 minutes.

11. Notes on standard tests.—Point out that:—

- i. On the sound of the rattle or shout of "gas," breathing must be stopped throughout the process of adjusting the facepiece and that, when adjusted, the facepiece must be gastight. The examiner will satisfy himself that this is so and that vision is clear.
- ii. On the shout of "spray," Part I of personal decontamination must be carried out immediately, i.e., all the exposed skin must be swabbed with cotton waste, gas ointment rubbed vigorously into all parts of the exposed skin—30 seconds on each part—and eyeshields changed; this must be followed by Part II.
- iii. Any man who does not correctly carry out the required actions (within 15 seconds when the action demanded is the adjustment of the facepiece) will fail.

12. Conclusion.—Impress on students the value of the tests. The more frequently these tests are carried out the higher the standard of gas discipline will be. The N.C.O. in command of a section or detachment, and the officer in command of a troop or a platoon, will have many opportunities (10 to 20 minutes on suitable occasions during the week) for carrying out the tests.

16. Fitting of respirators

1. Instructor's note.—Junior Leader Lesson No. 2. For this lesson, have as many different kinds and sizes of facepieces as are available. Draw on the black-board beforehand a number of simple diagrams to show the position of the wearer's eyes when the right and wrong sized facepieces are issued. Explain that:—

- i. The respirator will not give protection unless a proper fit is obtained.
- ii. The facepiece will be uncomfortable if worn for long periods unless it fits properly.
- iii. The better it fits, the less will be the reduction in the wearer's efficiency.

2. Marks and sizes available.—Inform students that the following marks and sizes of facepieces are supplied (exhibit those available and explain the differences of each):—

- i. Mark IV.—Small, normal, large.
- ii. Mark IV Special T—Extra small, small, large, extra large.
- iii. Mark IV Special T Mic—Small and large.
- iv. Mark V—Small, normal and large.

8. Fitting the respirator.—Demonstrate procedure by fitting a student as follows:—

- i. Take a normal size facepiece and slacken off the elastic bands. (Majority of individuals take a normal size).
- ii. Get the student to put on the facepiece.
- iii. Tighten the elastic bands in pairs. (Do not pull them too tight as this may prevent the facepiece from taking the shape of the face and thereby cause a leak.)
- iv. See that the bands are all exerting an even pull and are just sufficiently tight to hold the facepiece stable on the face without causing discomfort.

- v. **Examine the facepiece for size.** If the eyes are much above the centre of the eyepieces, the facepiece is too small; if much below the centre, it is too large; if approximately central, the size is correct. In making this examination the instructor's eyes should be at the same level as those of the student. (Illustrate the effect of correct and incorrect sizes by reference to the diagrams on the blackboard.)
 - vi. **Examine round the edges of the facepiece, particularly under the chin,** to ascertain that the facepiece is firmly on the face. (The wearer's chin must fit closely into the chin of the facepiece.)
4. **Test for gas tightness.**—Carry out a test for gas tightness as follows:—
- i. Squeeze the connecting tube so that no air can pass through it.
 - ii. Tell the wearer to attempt to breathe in.
 - iii. If the wearer is unable to breathe in and the facepiece is drawn on to the face, the fit is good.
 - iv. If air gets in through the sides of the facepiece, further fitting will be necessary.
5. **Fitting a man who wears spectacles.**—Point out that:—
- i. Personnel who wear spectacles must obtain those with metal frames of the approved type which are issued free. No other pattern may be worn with respirators.
 - ii. Only facepieces Mark IV Special T, Mark IV Special T Mic, or Mark V may be worn with these spectacles. The facepieces have a special contour near the temple which presses the flattened side member of the spectacles against the face of the wearer and ensures a gastight fit.
 - iii. The flattened side members should be just out of contact with the skin of the face, particularly near the eyes. Where necessary they should be bent or slightly twisted to ensure this.
 - iv. With the Mark V facepiece, the buckles at the temple may have to be bent slightly outwards to prevent it pressing against the spectacle frame.
 - v. Spectacles, when worn with respirators, should be treated with the anti-dimming compound or cloth on both sides of the glasses.
6. **Special cases.**—Inform students that special cases with facial deformities, scars and outsizes should be reported through the usual channels to formation headquarters, so that special fittings can be arranged. (Three facepieces are made, retained one by man, one by unit, and one by A.A.O.C.)
7. **Practice in fitting.**—Students should now form two ranks facing inwards and practise fitting facepieces to their opposite numbers, the instructor correcting faults as necessary.
8. **Gas chamber test.**—Point out that this test should take place as soon after fitting as possible. (Sec. 17.)

16A. Disinfection of Service Respirators

1. **Instructor's note.**—Junior Leader Lesson No. 3. Students require respirators and steel helmets. Seated in semi-circle facing the instructor. Instructor requires respirator and steel helmet, and the following stores for disinfection, two bowls filled with water, izal or cyllin, cotton waste or rag, one facepiece and container assembled.

Point out the procedure is governed by the circumstances which make it necessary for disinfection to be carried out. They are:—

- i. At least twice yearly, or oftener if necessary, by order of the Company. etc. Comd.
- ii. On every occasion that the facepiece changes ownership. Before facepieces are despatched to, or after their receipt from A.A.O.C. depots. If an epidemic or infectious disease occurs, the facepieces of all personnel suffering from the disease and contacts, as ordered by the Medical Officer.
- iii. Respirators of personnel found to be suffering from tuberculosis.

2. Demonstrate and explain the procedure for disinfecting respirators according to para. 1, sub-para. i above.

- i. A solution of izal or cyllin, 3 parts to 100 parts of water ($\frac{3}{4}$ pint to 3 gallons of water), will be prepared. The solution will be freshly prepared for use on each occasion, and not more than 100 facepieces will be disinfected with 3 gallons of the solution.
- ii. Sponge out the entire inner surface of the facepiece (including the eye-pieces) with the disinfecting solution, taking care not to allow the liquid to enter the air channel.
- iii. In the case of Mark IV facepieces care must be taken to avoid wetting the fabric covering of the facepiece, as this takes a long while to dry. In no circumstances must water or disinfecting solution be allowed to enter the air channel in the facepiece.
- iv. Turn the headharness over the outside of the facepiece to avoid contact with the disinfecting solution. Close the air channel in Mark IV facepiece by inserting the thumb therein, with the Mark V type close by squeezing with two fingers on the inside and the thumb on the outside of the facepiece.
- v. Pour about two egg-cups full of the disinfecting solution into the depression, and swill around. If the solution does not pass through the outlet valve, tilt the facepiece over and allow the liquid to escape.
- vi. Set the facepiece aside and continue the procedure with other facepieces, arranging the routine so that a facepiece stands with a film of the solution on it, for at least 15 minutes.
- vii. After the facepiece has stood for at least 15 minutes, repeat the procedure in iv and v above with clean water; sponge out the entire inner surface with clean cloth to dry, and set aside to complete drying. (Do not expose to direct sunlight.) When this is complete apply Anti-Dim and replace the facepiece in the haversack.

3. Allow students to practise this procedure, using their own facepieces. Instructor checking faults.

4. Demonstrate and explain the procedure for disinfecting affected respirators according to para. 1, sub-para. ii above.

- i. Prepare a solution as set out in para 2. i above. No more than 50 facepieces will be disinfected with 3 gallons of the solution.
- ii. The connecting tube will be detached from the container, and the whole facepiece and connecting tube immersed in the solution. Any receptacle, such as a bath or bin, may be used to accommodate a number of facepieces at one time.
- iii. After 15 minutes the facepieces will be removed from the disinfecting solution and thoroughly washed with water. In dealing with a large number of facepieces the use of a second bath or bin is advisable.

- iv. After the washing process, as much of the water as possible will be shaken off, and the facepiece dried out with a clean piece of cloth, then hung up by the connecting tube to complete drying. The facepiece must not be turned inside out or otherwise distorted, as this leads to cracking of the rubber.
- v. The inside of the neck of the container will be carefully wiped out with a cloth moistened with the solution, the greatest care being taken to prevent any moisture from entering the container.
- vi. When dry the facepiece will be rewired to the container. It is essential that all moisture be allowed to dry out of the connecting tube before the rewiring.

5. Explain the procedure for respirators affected according to para. 1, sub-para. iii above. The respirators of personnel suffering from tuberculosis should be destroyed if recommended by the Medical Officer. If this is not advisable, the respirators will be treated in accordance with the instructions contained in para. 4 above.

6. Interrogate students on the subject.

7. Deal with any questions from the squad.

17. Gas chamber test

1. *Instructor's note.*—Junior Leader Lesson No. 4. This lesson will be given at the gas chamber where the method of conducting the test will be detailed while the students themselves actually go through the test. While in the chamber, demonstrate and explain the method of putting up the required concentration. Stores required in the chamber are C.A.P. capsules, heater and improvised fan. Point out that:—

- i. The gas chamber test is necessary to confirm the correctness of the fit of the facepiece and to give confidence to the wearer that his respirator will give him complete protection.
- ii. The test should take place as soon after fitting as possible and thereafter at least once in every three months.

2. *C.A.P. capsules.*—Explain that:—

- i. C.A.P. (tear gas), used for the chamber test, is supplied in capsules, two capsules being required for every thousand cubic feet of space in the chamber. To keep up the concentration, further capsules will be used for subsequent squads as required. C.A.P. generators will not be used in a gas chamber. (Show tin of capsules.)
 - ii. Before use glass capsules should be broken at the stem by pliers, tip-breaker or other means. Gelatine capsules will be opened by hand on to a warmed dish. Place the capsules or contents on a metal dish and heat with a spirit lamp or candle. Prevent grease or wax from coming into contact with the metal dish. Do not allow the dish to become red-hot. Use an improvised fan to distribute gas evenly in the chamber. (Demonstrate method of breaking off stem of glass capsule.)
 - iii. The solid contents of C.A.P. capsules should not be allowed to come into contact with the skin, as slight irritation may result. If irritation is experienced, wash affected part with soap and water.
3. *Before entering the chamber.*—Carry out the following procedure:—
- i. Parade men upwind of the chamber with their respirators in the alert position.

- ii. See that each man has his own respirator.
 - iii. Explain the object of the test (para. 1, i, above).
 - iv. Emphasise that any man feeling the effect of the gas will on no account remove his facepiece, but will hold up his hand.
 - v. Order facepieces to be adjusted.
 - vi. Inspect each man, carry out the test for gas tightness and make any necessary adjustments of headharness.
 - vii. Leave a qualified N.C.O. outside to carry out any adjustments required as a result of the chamber test.
4. *Inside the chamber.*—Carry out the following procedure:—
- i. Keep men in single file. The number of men undergoing the test at one time will thus depend on the size of the chamber.
 - ii. Inspect each man at intervals.
 - iii. If a man is affected send him out to the N.C.O. for further fitting and, if necessary, examination of respirator.
 - iv. After about three minutes, order men to shake their heads and to bend down quickly, to ensure stability of the facepiece.
 - v. Move out of the chamber.
5. *After leaving the chamber.*—Carry out the following procedure:—
- i. Parade men upwind of the chamber, but downwind of other men waiting to be tested.
 - ii. Order removal of facepieces and examine each man for severe pressure marks on his face. If any man has such marks it indicates that the headharness is adjusted too tightly.
 - iii. Send the men through the chamber unprotected to demonstrate the protection afforded by the respirator. (This is only necessary on the occasion of the individual's first chamber test.)

18. Inspection of gas equipment

1. *Instructor's note.*—Junior Leader Lesson No. 5. Stores required are damaged or unserviceable items of personal gas equipment, which will be used as required throughout the lesson, with additional sets (if available) for practice purposes. Demonstrate and explain the procedure for inspecting gas equipment, as given in the following paragraphs; students should then be practised in it. Begin the lesson by pointing out that:—

- i. All items of personal gas equipment should be inspected regularly. respirators at least once a week.
 - ii. Presence of owner is necessary for testing respirator valves.
 - iii. Any repairs necessary to gas equipment should be reported at once, for action by the sub-unit gas N.C.O.
 - iv. Emergency repairs when in action (such as plugging a punctured connecting tube with any available means) will be a matter for common-sense.
2. *Facepiece.*—Taking each part in turn:—
- i. Headharness.—Elastic bands not unduly weak; head pad sound; buckles, tags and loops firmly attached and functioning correctly.
 - ii. Facepiece.—Material neither torn nor perished.
 - iii. Eyepieces.—Not damaged, screwed tight.
 - iv. Metal valve holder.—Not damaged, securely bound.
 - v. Outlet valve.—Guard not damaged, nut and split pin or captive nut in position.

3. Connecting tube.—Sound, no holes, securely attached at both ends. If container attached at wrong angle, connecting tube may twist and facepiece will not stay on face properly. Hold facepiece up by valveholder, letting container hang freely in order to see that container is in correct position relative to facepiece, i.e. when facepiece is adjusted, container hangs as follows:—

- i. In the case of the short tube, with the air inlet slots towards the wearer's left.
- ii. In the case of the long tube, with the air inlet slots towards the wearer's body.

4. Container.—Without holes or heavy dents. (Dents ringed with white paint have been passed by A.A.O.C.) Reasonably well protected by paint and free from rust. Neck securely attached to body. Piece supporting liner slot present. Slight looseness of contents unaccompanied by heavy denting not serious, but such containers should be replaced at first opportunity.

5. Inlet valve.—To test inlet valve, adjust respirator and close outlet valve by pressing a cloth over valve guard. Breathe out strongly. Defective inlet valve indicated by leakage through container. Always possible to force air to escape between edge of facepiece and face, but defective inlet valve will allow air to escape before this lifting of facepiece occurs.

6. Outlet valve.—To test outlet valve, adjust respirator, close connecting tube by pinching it, and test for leakage by attempting to inhale. Ensure no sign of leakage through valve. See that it is possible to breathe out through valve.

7. Haversack.—No holes in canvas, and all compartments securely in position and undamaged. Anti-dimming outfit present and not exhausted. Check marking on haversack with that on fibre disc on tube. Care must be taken to replace container in haversack in the correct way so that facepiece can be adjusted without twisting tube (Sec. 7, para. 5, i).

8. Eyeshields.—Should be flexible; and without cracks, perished elastics, or broken clips or press buttons.

9. Sleeve and ground detectors.—Flaking of paint, brittleness, or marked discoloration indicates unserviceability.

10. Cape and light suit.—Should not have developed tackiness ("primary tackiness" in new garments will disappear in use). Examine for damaged oil film, tapes torn off, damaged press buttons, tears, painted sleeves and badges of rank.

11. Ointment.—Smell of bleach when rubbed on skin and absence of marked crumbling and shrinkage in pots indicates ointment is still serviceable.

12. The instructor should point out that it will be for Junior Leaders to use their initiative in making convenient arrangements for the inspection.

19. Enemy gas weapons and gas intelligence

1. Instructor's note.—Junior Leader Lesson No. 6. Begin the lesson by pointing out that:—

- i. A large part of the value of gas is surprise. The more that is known of the way in which the enemy may use gas the less will be its danger.
- ii. The first part of the lesson (paras. 2 to 10) will be devoted to a general review of gas weapons and tactics with particular reference to those the enemy is thought likely to use. (Remind students that there may be other weapons, and that tactics are never stereotyped.)

- iii. The remainder of the lesson (paras. 11 to 14) is designed to give junior leaders the information they require on the subject of gas intelligence. (Stress that we do not intend to use gas until its use by the enemy has been confirmed; that confirmation takes time and that the first intelligence must come from junior leaders. Retaliation will be delayed if they do not at once pass on information with the necessary details.)
2. *Mortars*.—The mortar is one of the most common gas weapons, for it combines high rate of fire with a fairly good gas capacity. The Germans fire:—
- i. Tear gas from their infantry mortars.
 - ii. Other chargings from the larger mortar with which their special gas troops are armed. This larger mortar has a range of 3,000 to 6,000 yards.
3. *Rockets*.—The main characteristics of this weapon are:—
- i. To be effective they must be used in large salvos, all rockets arriving nearly simultaneously on the target.
 - ii. They can readily be distinguished in flight.
 - iii. At night, the flash of discharge is unmistakable.
 - iv. German rockets have a range of over 6,000 yards. A second salvo can be fired 90 seconds later.
4. *Gas shell*.—These may be fired from many types of guns, and may contain many types of chargings. For example:—
- i. Shell charged blister gas, with a small bursting charge, for ground contamination.
 - ii. Shell bursting in the air, with a small bursting charge, giving an effect like spray. (No German shell of this type is known as yet.)
 - iii. Shell charged choking, tear, nose or blister gas with a large H.E. effect. This is a favourite German type. (Para. 9 below.)
5. *Contamination weapons*.—All charged with blister gas. Mortars, rockets and artillery can be used to contaminate ground. Direct ground contamination weapons may be:—
- i. Bulk contamination vehicles.
 - ii. Portable sprayers (used to contaminate ground inaccessible to the bulk contamination vehicle).
 - iii. Purely static weapons, such as chemical mines and ground bombs, with a small bursting charge.
6. *Generators*.—The use of these depends entirely on the direction of the wind. They may be used to give off clouds of nose or tear gas.
7. *Hand grenades*.—These may be carried by enemy infantry. They may be charged with:—
- i. Tear gas, for immediate effect in the assault.
 - ii. A non-perisistent choking gas, for use against tanks.
8. *Air weapons*.—Spray and bombs. The Germans:—
- i. Pay particular attention to blister gas spray from low altitudes.
 - ii. Have bombs charged blister gas for ground contamination.
 - iii. Have bombs charged with choking gas.
 - iv. Have bombs which burst in the air and so give the effect of heavy spray.

9. Mixed gas and high explosive.—The enemy pays particular attention to concealing his use of gas under cover of high explosives. Therefore, once gas warfare has started, any very intense bombardment (apparently with high explosives only) must be suspected of including gas. The enemy may fire gas and high explosive projectiles at the same time. He has also shell, mortar bombs, rockets and aircraft bombs, in which a liquid gas and a high explosive charge are in the same case; note that, with this type of projectile:—

- i. The violent burst sounds like an ordinary H.E. shell.
- ii. The H.E. charge not only splinters the case but also shatters the liquid gas into a fine mist.
- iii. The fine mist, which is difficult to detect, is likely to injure the lungs and eyes.
- iv. The gas may also be a blister gas, when men near the burst may be splashed and will have to decontaminate themselves; but the first and main protection against this type of attack is the respirator.

10. Enemy gas tactics.—The probable gas tactics of the enemy may be summarized as follows:—

- i. A fierce bombardment lasting not more than two minutes is likely to contain gas, and to be the beginning of an attack. The enemy's object will be to attain the maximum surprise.
- ii. Long harassing bombardments at a slow rate of fire, designed to lower morale and gas discipline. At any time the enemy may try a surprise shoot as in i above.
- iii. Small amounts of tear gas shell over long periods, designed to lower gas discipline. This, too, may be followed by a surprise shoot of great intensity when the enemy expect casualties among men who no longer trouble to adjust their respirators quickly.
- iv. Contamination of ground in defence. Belts of contamination are unlikely to be deep. By good observation (especially since the enemy uses large amounts of gas which can readily be seen) it should often be possible to pick a fairly clean way through, and if men do not lie down, but carry out personal decontamination afterwards, they will often suffer no injury. The enemy will put down contamination as late as possible. Fake contamination may be used.
- v. Gas mixed with smoke. Hostile smoke should therefore be treated as gas until proved otherwise.

11. Intelligence.—Information on the enemy's weapons and tactics is always required. In all units certain personnel are charged with the duty of collecting, sifting and distributing all information gained. In a battalion, for example, the intelligence section performs these duties. All ranks must, however, be taught that the collection of information is not the business only of the special intelligence personnel. Every individual soldier must be restlessly inquisitive in the quest of information and must report anything he observes. The use of gas by the enemy is one of the many items about which information is required.

12. Gas intelligence.—In order to guard against surprise, accurate and timely information of the enemy's intention to use gas is of the utmost importance at any time. Any information that establishes the enemy's first use of gas, or the suspected use of a new gas, will be treated as the most urgent intelligence. Reports on the subsequent use of gas will be a routine matter.

13. Intelligence reports.—Gas intelligence reports should include:—

- i. Place and time of gas attack.
- ii. Gas weapon used.
- iii. Type of gas.
- iv. Casualties.
- v. Conditions of weather and ground.

14. Intelligence materials.—The following materials are required for examination:—

- i. Generous samples of contaminated material.
- ii. Specimens of our own respirators or protective equipment if they appear to fail or give unexpected results.
- iii. Fragments of gas projectiles. Unexploded projectiles will be reported but not moved.
- iv. Enemy respirators and protective equipment.

20. Effects of weather and ground on gas

1. Instructor's note.—Junior Leader Lesson No. 7. Begin the lesson by pointing out that:—

- i. Gas and smoke are more affected by conditions of weather and ground than other weapons.
- ii. In spite of this, conditions will rarely be so unfavourable that no kind of gas can be used; it is necessary, therefore, to be on the lookout for gas whatever the conditions.
- iii. A general knowledge of how the weather and ground do affect the use of gas is, however, necessary for leaders, so that they can appreciate what the possibilities are in their own area.

2. Effects of weather on the use of non-persistent gases.—The chief weather factors affecting non-persistent gases are the direction and speed of the wind, and the turbulence of the atmosphere:—

- i. Wind direction.—Projectile weapons are not likely to be used against forward enemy troops when the wind is likely to blow the gas back, so as to be dangerous to friendly troops. (Generators can, of course, be used only when the wind is blowing from the point of release towards the target.)
- ii. Wind speed.—Strong or gusty wind causes gas to disperse; on the other hand, if there is no wind the gas will tend to stay in one place, and this is not always desirable. Generally speaking, the ideal is a light or gentle breeze (as a guide, one which is just strong enough to keep leaves and twigs in constant motion).
- iii. Turbulence.—On hot, sunny days the hot air near the surface of the earth is constantly rising while cold air from above is falling. This effect of turbulence causes gas to disperse rapidly, and sunny days are therefore bad for the use of non-persistent gas. On cold, clear nights the cold air near the surface of the earth has no tendency to rise, and this condition is the best for the use of non-persistent gas. Intermediate conditions, such as cloudy nights, overcast days, and times round about dusk and dawn are fairly good.

3. Effects of ground on the use of non-persistent gases.—Built-up areas, woods, valleys, hollows in the ground, and enclosed spaces generally are the best targets for non-persistent gas attack, as will be seen from the following facts:—

- i. Open country.—Not usually very good for non-persistent gas as released from projectiles, as the gas will disperse comparatively quickly. (Clouds released from generators will, however, travel well over open country especially if the ground is not very broken.)
- ii. Valleys.—Gas clouds tend to follow valleys, and, in the absence of wind, may hang about for a considerable time.
- iii. Built-up areas, woods, and enclosed spaces.—These provide good targets for non-persistent gas projectiles, since the gas is released within the area and tends to hang about. (On the other hand, they are not very good targets for generator attacks, since gas clouds travel-

ling with the wind tend to rise over obstacles, such as buildings or woods, when they meet them.)

4. *Effects of weather on the use of persistent gases.*—It must first be understood that conditions which favour great persistence do not favour a high vapour concentration; similarly, conditions which favour a high vapour concentration do not favour great persistence. The chief weather factors which influence persistence and vapour concentration are:—

- i. Wind.—A strong wind causes liquid gas to evaporate more quickly, and so reduces the time of persistence. This does not mean that a strong wind increases the vapour concentration, since the vapour, though produced more quickly, is dispersed more by the wind.
- ii. Temperature.—High temperature increases the rate of evaporation and reduces the persistence. The high vapour concentration which results from high temperature is offset to some extent on sunny days by the turbulence of the atmosphere.
- iii. Rain.—Rain tends to slow down the rate of evaporation, and so to reduce the vapour concentration. (Heavy rain, falling on a hard surface which has been contaminated, will wash away some of the gas which may still be dangerous at the place to which it is removed.)

5. *Effects of ground on the use of persistent gases.*—On dry, porous ground the liquid tends to sink below the surface and thus persistence is increased while vapour concentration is decreased. On hard ground, liquid tends to stay on the surface and to evaporate more quickly; thus the time of persistence is shorter but the vapour concentration is greater.

21. Blister gases

1. *Instructor's note.*—Junior Leader Lesson No. 8. Begin the lesson by pointing out that:—

- i. Junior leaders require additional knowledge of blister gases because they are likely to be used on the widest scale, and because of the difficulties of recognizing and dealing effectively with them.
- ii. Blister gases are used to handicap the enemy either by causing casualties or by imposing precautionary measures to prevent them. Gas training is designed to ensure that the handicap the enemy aims to impose on us is as small as possible.
- iii. The tactical situation will frequently demand the acceptance of certain risks with blister gas, as is the case with other weapons of war. In appreciating what risks are involved in any particular set of circumstances, and in deciding which to accept, junior leaders must be prepared to use their military and gas knowledge and their common sense.

2. *Two-fold danger of blister gases.*—These gases can cause casualties either as a result of contamination by the liquid, or as result of exposure to the vapour. The respirator does not supply the complete answer, for both the liquid and the vapour attack all parts of the body; and the respirator only gives protection to a part of it. The protective action taken when contamination by the liquid has occurred differs from that required as a result of exposure to the vapour. It should be borne in mind, however, that serious casualties can result from the action of blister gas vapour on the eyes and breathing passages unless prevented by the timely adjustment of the respirator.

3. *Mustard gas.*—This is an important example of a blister gas. The characteristics of mustard gas may be summarized as follows:—

- i. Pure mustard gas is colourless. The crude substance as used in war may vary in colour from light brown to nearly black

- ii. Both pure and crude mustard gas give off an invisible vapour which has a slight smell resembling onions, horseradish or garlic. With continued breathing of the vapour the smell becomes less noticeable and the fact that the gas cannot be smelled does not mean that it is not present.
- iii. A danger of mustard gas lies in the fact that neither the liquid nor the vapour produce any immediately painful effects, and untrained men may become unnecessary casualties through not taking the proper action when exposed to the vapour or contaminated by the liquid.
- iv. Mustard gas dissolves in spirits, petrol, oils and fats.
- v. The liquid is quickly destroyed by gas ointment, and also by bleach ("chloride of lime"). Bleach paste rubbed into the skin for one minute, and then swabbed off, is an effective substitute for gas ointment.

4. *Blister gas liquid released in the form of spray.*—Spray from containers fixed to aircraft may be released effectively from any height. Spray from airburst bombs or shell may also be effective. A low flying spraying aircraft is very vulnerable to small arms fire, and in this case the first action should be to reply with fire. Protection against the effects of spray is given by personal decontamination. The gas cape or light gas suit play an important part in preventing contamination of clothing by spray (the drenching effect of low spray should be noted especially). The cape should not be adjusted over contaminated clothing as this will create a dangerous vapour concentration.

5. *Blister gas liquid from ground burst projectiles.*—In the case of ground burst projectiles, the immediate adjustment of the facepiece is necessary to give protection to the eyes and breathing passages against the fine mist caused by the burst of the projectiles. Personal decontamination should be carried out subsequently by those individuals who were near the burst and splashed with the liquid.

6. *Blister gas liquid on the ground.*—It is a desirable precaution whenever the military situation permits, to avoid liquid contamination. Blister gas liquid on the ground must not, however, be treated as an obstacle; it will frequently be necessary in the field for troops on foot to cross such ground, more especially the leading troops. Even so, little if any significant liquid contact need be made in daylight provided that care is used, long grass and bushes are avoided and troops do not lie down. When such precautions are not possible or desirable (e.g. at night or under aimed fire or when troops are forced to lie down) capes should be worn, ointment used to protect the exposed skin, obvious liquid avoided, and personal decontamination carried out at the earliest opportunity—particularly the swabbing of boots.

7. *Handling of articles contaminated with blister gas liquid.*—Contaminated articles can be handled with reasonable safety provided ointment is first rubbed into the hands (including ointment underneath the finger nails) and a visible film of it is thereafter maintained until the danger of contamination is over. After handling contaminated material in this manner, the ointment should be wiped off with cotton waste and fresh ointment rubbed into the hands. (The cape or light gas suit should be worn when there is danger of contaminated articles coming into contact with clothing.)

8. *Blister gas vapour.*—The smell of blister gas is an unreliable guide to the degree of vapour danger present, and it is possible that blister gas having little or no smell will be used. For these reasons it is necessary to teach that the respirator will be adjusted, not only when blister gas is smelled, but also when in an area contaminated with suspicious liquid (Sec. 5, para. 4). When the tactical situation demands that troops remain in a dangerous vapour concentration, the ultimate effects may be largely reduced by adopting the following procedure:—

- i. Troops wearing A/V clothing.—Adjust respirator and rub ointment into all exposed skin. It is also an advantage to tie a handkerchief between the neck and the collar, and to tuck in the cuffs of the tunic. (The cape or light gas suit should not be worn unless there is danger of contact with the liquid.)
- ii. Troops not wearing A/V clothing.—As for i above, but such of these troops as remain in the dangerous vapour concentration for more than an hour or so (less on a hot day) are likely to sustain vapour burns (ultimately) underneath the clothing. On leaving the area, outer clothing should be removed and aired for as long as possible, or until the smell of the vapour has disappeared. Washing the body all over with soap and water may also be of value.
- iii. Under supervision, respirators may be removed for a few minutes when it is necessary for men to eat or drink.

22. Effects of gas on food and water; blister gas reconnaissance; and decontamination of ground

1. *Instructor's note.*—Junior Leader Lesson No. 9. The lesson comprises three parts. The stores required for the respective parts are:—

- i. Effects of gas on food and water.—A few empty food tins and wooden boxes of various sizes, some water (to simulate petrol), a bucket of bleach paste (or mixture of sand and water to simulate bleach paste), a few sandbags or rags for use as swabs, a gas warning sign, an A.F. A2028, and some blister gas training mixture.
- ii. Blister gas reconnaissance.—Battle order with rifles for five students, three pairs of over-boots, eight sandbags for use as improvised over-boots, pad of ground detectors, some gas warning signs, and some blister gas training mixture.
- iii. Decontamination of ground.—Two buckets containing dry bleach (or dry sand to simulate bleach), two g.s. shovels, two pairs of over-boots, and some blister gas training mixture.

2. *Effects of gas on food and water.*—Point out that all war gases in liquid or solid form make both food and water dangerous and unfit for human consumption. Blister gas vapour is absorbed by fatty and oily foods and will make them dangerous. Other gases in vapour or smoke form do not make food or water dangerous, but may make them unpalatable. The main danger is from blister gas liquid. The following points should be explained:—

- i. Protection of food.—Food must be stored and cooked under cover. This can be provided for by the use of tarpaulins and ground sheets. The field service ration is available in tins of various sizes which give complete protection, and these should be retained for the storage of further supplies after having been emptied.
- ii. Detection of contamination.—Spray detectors should be placed round food supplies and cookhouses and regularly inspected. When contamination is suspected or confirmed the food must not be used until it is passed as fit for consumption by the unit gas officer in consultation with the medical officer; any case of doubt will be referred to the nearest supply officer. Contaminated supplies must be separated and marked with gas warning signs or contamination labels (A.F. A2028).
- iii. Decontamination of food supplies.—Canned food supplies are safe, but the outside of the cans should, if not required at once, be swabbed with a sandbag or rag moistened with petrol and set aside in a free current of air; if wanted for early use, they should be smeared with bleach paste and left as long as possible before rinsing in water and

wiping dry. Wooden cases must have their contents turned out and examined. If not badly contaminated, wooden cases may be temporarily rendered safe to handle by applying bleach paste, but the cases must subsequently be burnt. Wrapped and open foodstuffs must be laid aside for inspection. (Demonstrate these actions, using two of the students.)

- iv. **Water.**—Water contaminated with liquid or solid gases must not be used. Advice must always be obtained from the medical officer before water which is suspected of being affected is used or put into water carts. Chlorination of water is not sufficient.

8. Blister gas reconnaissance.—This part of the lesson should be mainly a demonstration; utilize five of the students for this purpose. Overboots to be worn by three students and sandbags by two, with capes in the worn position when there is a risk of bodily contact with the liquid contamination, e.g. bushes. Spread some blister gas training mixture on to part of a road or track and on the ground on either side, including hedge and bushes if these exist. Proceed as follows:—

1. Explain that leading troops on foot have advanced along the road (or track) and encountered blister gas contamination. Point out that the contamination will have been put down with the object of delaying them or of forcing them into ground where they will be more exposed to small arms fire. Leading troops should not allow themselves to be delayed by contamination; they should normally push straight through, avoiding obvious liquid, and sending back a report giving the location of the contamination. A detailed reconnaissance of the area will be carried out later by a gas reconnaissance party provided by a reserve sub-unit.
2. The five selected students will now be employed to demonstrate the action of a gas reconnaissance party, the instructor giving the detail as follows: The leader on reaching the site details two men to go on each side of the road. Each pair is given a few gas warning signs and a supply of ground detectors. They will depend mainly on their senses of sight and smell to find the extent of the contamination, confirming where necessary with ground detectors. (Note that with blister gas training mixture a red stain will not show on the detector.) On finding contamination one man should move outwards till clear of the contamination and then place gas warning signs in position, approximately 20 yds. from the contamination. The gas warning signs will be timed and dated. As soon as a clear way round has been found the leader should improvise route direction signs, e.g. marking trees, using sticks, or cutting arrows in the ground with the entrenching tool. When the clear route cannot be marked men may have to be posted to guide oncoming troops, but it must be stressed that this method is uneconomical in men and should not be adopted unless necessary.
3. Draw attention to the dress of the gas reconnaissance party, pointing out that sandbags should be worn when over-boots are not available. Respirators to be adjusted when working downwind. Capes or light gas suits should not be worn unless there is danger of contact with the liquid. Remind students of the other precautions to be taken against vapour. (Sec. 21, para. 8.)

4. Decontamination of ground.—This part of the lesson should be mainly a demonstration, utilizing two students, wearing overboots, to assist. Proceed as follows:—

1. Point out that the decontamination of ground is a laborious process which is rarely resorted to in the field. When it is essential, the aim will be to make the surface safe for use. For this purpose

it is not necessary or practicable to destroy every trace of contamination.

- ii. Explain that enough dry bleach should be used to give a white surface. As a rough guide, 1 lb. of bleach is required for each square yard of heavy contamination, or one heaped g.s. shovelful for 3 to 4 sq. yds.
- iii. Remind students that dry bleach in contact with blister gas liquid causes it to burst into flame and give off blister gas vapour. Personnel immediately downwind should, therefore, be moved beforehand or should adjust their respirators.
- iv. Place some blister gas training mixture on the ground to represent contamination. Use the two students to demonstrate the method explained in ii above; they should work from the upwind edge.
- v. Remind students of the precautions to be taken (para. 3, iii, above), pointing out that vapour danger can be avoided by working from the upwind edge.

CHAPTER IV—TRAINING EXPEDIENTS

23. Choking gas attack.

1. *Phosgene in small cylinders.*—Small cylinders containing phosgene are provided for use at gas compounds (Sec. 28). Their purpose is to give individuals an opportunity to recognize this gas. The following instructions apply:—

- i. Phosgene cylinders will be used under the supervision of an officer who has qualified at the LHQ or First Aust Army Gas School.
- ii. In cold weather, the bottom half of the cylinder should be placed in a bucket of warm water for about 15 minutes before use, to ensure vaporization.
- iii. Personnel should be upwind of the cylinder until the gas is being released, and should then pass in single file through the gas.
- iv. When phosgene is used all personnel in the vicinity will carry respirators.
- v. The instructor in charge will have a rattle in his possession which he will sound in the event of a dangerous concentration being inadvertently released.

See Appendix "C."

2. *C.A.P. generators.*—These generators, although producing a tear effect only, are used during training to represent a choking gas, since exposure to the gas necessitates the immediate adjustment of the respirator. The following instructions apply:—

- i. The generator is set in operation by removing the tear-off strip in order to expose the emission holes, removing the adhesive tape and lid, and striking the match composition with the striker supplied. When ignited it should be held vertically with the ignition pellet at the bottom. The generator is then placed on the ground upright with the ignition end downwards. After a few seconds' delay a cloud of tear gas is evolved from the emission holes.
- ii. The cloud from a single generator continues for about one and a half minutes, and is an effective harassing agent for a distance which depends upon the weather conditions (Sec. 20). In average conditions, a single generator will be effective if operated about 100 yds. upwind of troops.
- iii. The wind direction should be noted and generators should be placed in such a position that the resulting cloud will be carried over the objective. If it is desired to use a number of generators, they should be placed in a line at right angles to the wind, and at least 1 yd. apart, so that should any burst into flame they will not set fire

to others. Under these conditions, the greater the number of generators employed, the greater will be the width of the cloud and its effective distance of travel.

- iv. Care should be taken to ensure that the gas does not travel over public roads or dwellings. The distances downwind for the gas to produce no perceptible effect vary according to weather conditions (Sec. 20). In average conditions a single generator is not likely to inconvenience unprotected persons more than half a mile downwind. Special care should be exercised at night.
- v. The generators will not be used inside buildings or in confined spaces.

24. Nose gas expedients

1. *D.M. ampoules.*—These are used to produce a concentration of D.M. in a gas chamber. All officers and other ranks will experience this gas at least once, so that they may be enabled to recognize nose gas when they meet it in the field and appreciate its delayed action effects. The following instructions apply:—

- i. This gas training will be conducted by an officer or N.C.O. who has qualified at the Army Gas School.
- ii. D.M. ampoules contain a solution of D.M. in liquid, each ampoule being sufficient to give a concentration of D.M. for a 1,500 cu. ft. gas chamber.
- iii. The ampoule is opened by moistening the neck, scratching it sharply with the glass cutters provided, and then snapping off the tip.
- iv. An iron dish or tin lid is warmed gently, but not allowed to become red hot. The dish is then removed clear of any flame or heater and the contents of the ampoule are poured into it. (Separate dishes will be used for D.M. and C.A.P.)
- v. The dish is then heated gently until the liquid has evaporated, leaving a solid residue of D.M. If a naked flame is used the dish should be held a few inches above it since the liquid is inflammable.
- vi. When the liquid has evaporated, the temperature is increased by moving the dish nearer to the source of heat and the solid residue is scratched with a nail or other suitable instrument, with continued heating, until no more D.M. is seen to come off. If the source of heat is a flame, the dish should be moved about over it in order to ensure even heating of the bottom of the dish.
- vii. The contents of the chamber are then thoroughly mixed by fanning.
- viii. Personnel will enter the chamber wearing facepieces, and keep them on for two minutes to prove that their respirators give complete protection. Facepieces will then be removed in the chamber and personnel will remain in the gas for a further two minutes without protection. Facepieces will then be adjusted, and one minute later personnel will leave the chamber and move about at a marching pace for ten minutes before removing their facepieces.
- ix. Provided that the correct number of ampoules for the size of the gas chamber have been used, the concentration should be adequate for three parties, after which the chamber should be cleared completely of gas and a fresh concentration of D.M. put up, using the same amount of solution as before. This procedure should be repeated for every three parties. It is not permissible to augment in any way the D.M. concentration in the chamber.
- x. No officer or other rank should be required to experience D.M. more than once in the gas chamber.

2. D.M. generators.—These training generators are used for producing a non gas cloud for use during outdoor exercises. No restriction should be imposed on exposure of troops to their effects under normal training conditions (compare para. 1, x, above). The following instructions apply:—

- i. The generator is set in operation by removing the tear-off strip at the base so as to expose the emission slots, removing the adhesive tape and lid, and striking the match composition with the striker provided. The generator is then placed on its side, with the ignition end to the rear. After a few seconds delay a cloud of D.M. is evolved from the emission slots.
- ii. The cloud from a single generator continues for about two and a half minutes, and is an effective harassing agent for a distance which depends upon the weather conditions (Sec. 20). In average conditions a single generator will be effective if operated about 100 yds. upwind of troops.
- iii. The wind direction should be noted and generators should be placed in such a position that the resulting cloud will be carried over the objective. If it is desired to use a number of generators, they should be placed in a line at right angles to the wind, and at least 5 yds. apart. Under these conditions, the greater the number of generators employed, the greater will be the width of the cloud and its effective distance of travel.
- iv. Care should be taken to ensure that the gas does not travel over public roads or dwellings. The distances downwind for the gas to produce no perceptible effect vary according to weather conditions (Sec. 20). In average conditions a single generator is not likely to inconvenience unprotected persons more than half a mile downwind. Special care should be exercised at night.
- v. The generators will not be used inside buildings or in confined spaces.

25. Tear gas attack.

1. C.A.P. capsules.—These are used to produce a concentration of tear gas in a gas chamber in order to confirm the correct fit of the respirator and to give the wearer confidence in it when exposed to actual gas. Instructions for the use of C.A.P. capsules are given in Sec. 17.

2. B.B.C.—This persistent tear gas, when supplied for training purposes, will usually be stored at gas compounds (Sec. 28). The following instructions apply:—

- i. B.B.C. will be used under the supervision of an officer or N.C.O. who has qualified at the Army Gas School.
- ii. Whenever handling B.B.C., the operator will wear eyeshields or the respirator to prevent the liquid from entering and consequently injuring the eyes. (Liquid B.B.C. on the skin should be swabbed off and the affected parts washed with soap and water; gas ointment is of no value against persistent tear gas.)
- iii. A suitable method of using B.B.C. at gas compounds, to demonstrate an example of a persistent tear gas, is to sprinkle a small quantity on to sacking.

26. Blister gas attack.

1. Mustard gas in pint pots.—Mustard gas, in stoneware bottles holding approximately 1 pint, is kept at gas compounds (Sec. 28) for the purpose of familiarizing troops with the appearance and action of blister gas. The following instructions apply:—

- i. Demonstrations with mustard gas will be conducted by officers and N.C.Os. who have qualified at the Army Gas School. (See also para. 3 below.) (See Appendix "H.")
- ii. In a gas compound, a small quantity of mustard gas will be poured out on to a concrete or metal surface, and during pouring the pot should be held close to the surface. Personnel will note the appearance and smell by passing downwind. The concrete or metal surface will be decontaminated, using dry bleach, the attention of personnel being drawn to the flames caused by this action.
- iii. In cold weather, in order to produce a noticeable smell, a small quantity of mustard gas should be poured into a shallow metal receptacle and heated over a spirit stove. The metal receptacle will be decontaminated subsequently, using dry bleach.
- iv. A grass sod, and later some loose earth, should be placed on the concrete or sheet iron surface and the appearance of mustard gas on them demonstrated; the sod and earth being subsequently placed in the mustard gas pit (Sec. 28, para. 1, iii) and covered with dry bleach.
- v. The appearance of drops of liquid on sleeve detectors, spray detectors, ground detectors, detector paint, cape, dubbed boots, clothing and equipment will be demonstrated. An unserviceable boot, and small pieces of unserviceable serge clothing, gas cape, and web equipment will be used for demonstration.
- vi. Confidence in the efficiency of gas ointment and practice in its proper use will be given by placing a large drop of mustard gas on the bare forearm of each man. He will then swab it off and apply gas ointment, as in personal decontamination. The opportunity will be taken to emphasize that a blister will result unless the ointment is well rubbed in for 30 seconds.
- vii. Similar demonstrations may be given in an improvised unit gas compound. (Sec. 28, para. 5.)
- viii. When empty, pint pots should be immersed in water, which is then boiled, in order to decontaminate them, but not placed directly into boiling water.

2. Venting of pint pots of mustard gas.—All pint pots will be vented at intervals of not more than six months in order to release any pressure formed. The gas which escapes during the process of venting is not mustard gas, but a product of its decomposition. The following instructions apply:—

- i. The operation will be carried out under the supervision of an officer or N.C.O. who has qualified at the Army Gas School.
- ii. The operator should be dressed in a light gas suit, with the respirator adjusted. Gas gloves should be worn.
- iii. Slowly loosen the stopper until a hiss indicates an escape of gas.
- iv. Allow to stand until hissing ceases.
- v. Repeat slow releasing of pressure until the stopper can be removed completely.
- vi. Insert a thin piece of stick into the liquid to release any excess dissolved gas. Violent frothing may occur when the stick enters the liquid, and the operator should ensure that the open end of the pot is pointing away from him.
- vii. Carefully remove the stick when the gas has ceased to be given off and place it in the mustard gas pit.
- viii. Replace stopper.
- ix. Wipe off any contamination from around the stopper with dry cotton waste.

3. Precautions when demonstrating mustard gas.—When demonstrating the gas, undue precautions on the part of the demonstrator are to be avoided as being likely to teach a false lesson; he will therefore wear no protective equipment apart from eyeshields and an application of gas ointment. All ranks present will wear eyeshields.

4. Blister gas training mixture.—This is used to represent blister gas. It is harmless to the skin and clothing, and has no harmful effects on ground or vegetation, thus allowing of its unrestricted use. The following instructions apply:—

- i. It can be used as issued, care being taken to shake the container well to ensure thorough mixing.
- ii. Before use in cold weather, the container should be partly immersed in a bucket of warm water for about 15 minutes.
- iii. When used from a stirrup pump, to simulate spray, the mixture should be diluted with its own volume of water.

27. Gas chambers

1. Purposes.—Gas chambers are used in training for the following purposes:—

- i. By means of tear gas, to confirm the fit of the respirator, and to give the wearer confidence in it when exposed to actual gas. (Sec. 17).
- ii. To give personnel experience of the effects of nose gas. (Sec. 24, para. 1.)

2. Choice and siting.—Any reasonably airtight room, tent or other enclosed space of moderate size can be used as a gas chamber provided that it is subsequently cleared of gas and unoccupied for 24 hours. When gas chambers are sited within 100 yds. of any road or dwelling, the gas should be allowed to disperse gradually, i.e. by the opening of one door or one window.

3. Units may obtain the use of a Mobile Gas Trailer or Gas Van by application through the usual channels. The instructions for their use are the same as for Gas Chambers.

28. Gas compounds

1. Description.—A gas compound is a place set apart for the purpose of providing troops with an opportunity of encountering actual war gases. It comprises an area of 50 yds. square, enclosed by a double-apron barbed wire fence, and contains:—

- i. A gas chamber.
- ii. A concrete surface (on which actual mustard gas may be used), and other typical road surfaces (on which blister gas training mixture may be used). A suitable sheet of metal may be used in lieu of concrete.
- iii. A mustard gas pit for the disposal of contaminated material.

2. Stores available at gas compounds.—The following stores are provided for gas compounds:—

Phosgene.
Mustard gas.
B.B.C.
D.M. ampoules.
Bleach.
Ground detectors.
Spray detectors.
Gas rattle.
Gas warning signs.
Spirit stove.

3. *Stores to be taken to gas compounds.*—Units will take with them any other stores that may be required, such as:—

C.A.P. capsules.
Blister gas training mixture.
Cotton waste.
Sleeve detectors.
A smooth board or piece of metal painted with detector paint.
Stirrup pump.
Buckets.
Shovels.

4. *Use of gas compound.*—Within the compound, the following can be demonstrated and details of procedure will be found in relevant sections:—

- i. Phosgene. (Sec. 23, para. 1).
- ii. D.M., in the gas chamber. (Sec. 24, para. 1.)
- iii. C.A.P., in the gas chamber. (Sec. 25, para. 1.)
- iv. B.B.C. (Sec. 25, para. 2.)
- v. Mustard gas. (Sec. 26, paras. 1 to 3.)
- vi. Blister gas training mixture. (Sec. 26, para. 4.)

5. *Improvized gas compounds.*—Units may draw phosgene, B.B.C. and mustard gas from the nearest compound to enable demonstrations to be given without the necessity of men under instruction going each time to a gas compound. The following instructions apply:—

- i. The unit will improvize a compound consisting of an area approximately 5 yds. square, enclosed by a single-apron barbed wire fence having a gate (which can be secured by a padlock), and marked with a gas warning sign.
- ii. Within the compound, a slab of concrete or sheet of metal will be provided on which to pour small quantities of mustard gas. A mustard gas pit will be dug within the enclosure for the disposal of contaminated material.
- iii. The instructions given in Sec. 23, para. 1; Sec. 25, para. 2; and Sec. 26, paras. 1 to 3.
- iv. The gases will be kept by the unit in the improvised compound shaded from the direct rays of the sun.
- v. When empty, the containers will be returned to the compound from which they were drawn.

CHAPTER V—SUITABLE OUTDOOR PROBLEMS

29. Action when choking gas is encountered

1. *Object of problem.*—To practise leaders and men in the correct action to be taken when choking gas is encountered.

2. *Stores required.*—C.A.P. generators, to represent choking gas released by means of ground burst projectiles. Thunder-flashes, to represent the noise of bursting projectiles.

3. *Situation.*—A sub-unit at work (e.g. digging, wiring, A.F.V. maintenance, manning guns or searchlights) is subjected to an attack with choking gas, either by day or by night.

4. *Action by umpire or director.*—Cause C.A.P. generator and thunderflashes to be ignited upwind of the sub-unit, and then note:—

- i. *Position of sentry.*—That he has been correctly posted upwind of the sub-unit.
- ii. *Action of sentry.*—That he sounds the rattle, adjusts his respirator facepiece, and then sounds the rattle again for at least 30 seconds.
- iii. *Action of all ranks.*—That respirator facepieces are adjusted immediately, and work in progress continued.
- iv. *Action of commander on the spot.*—That, after adjusting his respirator facepiece, he tests for gas to determine the type of gas being used and informs his immediate superior. That he satisfies himself that none of his men has been affected by the gas (if they have, he must test respirator fitting after the exercise). That he tests for gas every few minutes until satisfied that gas is no longer present.
- v. *Action when "gas clear" is given.*—That, after the commander on the spot has given "gas clear," all men test for gas before removing their respirator facepieces.

5. *Remarks.*—This or a similar problem should be introduced frequently during training. Note precautions to be observed (see Sec. 23, para. 2.)

30. Action when nose gas is encountered

1. *Object of problem.*—To practise leaders and men in the correct action to be taken when nose gas is encountered.

2. *Stores required.*—D.M. generators, to represent nose gas released by means of ground burst projectiles. Thunderflashes, to represent the noise of bursting projectiles. Smoke generators, to represent screening smoke.

3. *Situation.*—As for Sec. 29, para. 3.

4. *Action by umpire or director.*—Cause D.M. generators and thunderflashes to be ignited upwind of the sub-unit. As a variation, smoke generators can be ignited beforehand to conceal the nose gas. To note action as for Sec. 29, para. 4, and, as regards smoke, as for Sec. 14, para. 10.

5. *Remarks.*—Note precautions to be observed (see Sec. 24, para. 2).

31. Offensive action in the presence of gas

1. *Object of problem.*—To practise leaders and men in taking offensive action in the presence of gas.

2. *Stores required.*—As for Sec. 29, para. 2. In addition, two men (concealed) will be required with rifles and blank ammunition to represent enemy using small arms fire from a distance of about 200 yds.

3. *Situation.*—A sub-unit (e.g. an infantry section) advancing on foot in daylight, encounters choking gas and small arms fire simultaneously.

4. *Action by umpire or director.*—Cause C.A.P. generators and thunderflashes to be ignited upwind of the advancing sub-unit. The two concealed men, representing the enemy, to open fire when the gas reaches the advancing sub-unit. To note adjustment of respirator facepieces while sub-unit is:—

- i. Deploying into a fire position, and subsequently engaging the enemy with fire, or
- ii. Continuing forward movement under cover.

5. *Remarks.*—Selection of suitable ground, wind direction and location of representative enemy are important considerations. Note precautions to be observed (see Sec. 23, para. 2).

32. Blister gas from ground burst projectiles

1. *Object of problem.*—To practise leaders and men in the correct action to be taken when attacked by ground burst projectiles charged with blister gas.

2. *Stores required.*—Thunderflashes and some blister gas training mixture.

3. *Situation.*—A sub-unit in action, halted, either by day or by night.

4. *Action by umpire or director.*—Cause thunderflashes to be ignited just upwind of the troops and blister gas training mixture sprinkled in the occupied area. If necessary, the umpire should announce "these explosions represent gas shell." Then note:—

- i. As soon as it is appreciated that gas is being released from ground burst projectiles the sentry should sound the rattle. All facepieces should be adjusted immediately, those men contaminated by the liquid carrying out personal decontamination Part I as early as possible.
- ii. Personal decontamination Part II, as necessary, including decontamination of weapons, should be carried out. This should be organized by the commander on the spot, due attention being paid to the execution of the task in hand.
- iii. The commander on the spot should report the incident and the situation to his immediate superior.
- iv. If a picture has been given of effective ground contamination, precautions should be taken to protect the skin against vapour. (Sec. 21, para. 8.) Alternatively, if the nature of the task permits, troops should be moved clear of the vapour danger.

5. *Remarks.*—To add more realism, a few drops of blister gas training mixture should be placed on the clothing, weapons and exposed skin of individuals.

33. Blister gas spray when on the move

1. *Object of problem.*—To practise leaders and men in the action to be taken when contaminated with blister gas spray when on the move.

2. *Stores required.*—A bucket of blister gas training mixture and a stirrup pump.

3. *Situation.*—A sub-unit marching along a road, either by day or by night.

4. *Action by umpire or director.*—Cause the blister gas training mixture to be sprayed, from behind cover, on to the marching troops. To note:—

- i. Verbal warning "spray" given by the commander on the spot.
- ii. The action required by Part I of the sequence of personal decontamination should be carried out by every individual immediately on hearing the verbal warning "spray." (See para. 5 below on the subject of offensive action.)
- iii. Umpires should satisfy themselves that the ointment is rubbed really vigorously into the exposed skin, for not less than half a minute on each part.
- iv. Before Part II of the sequence of personal decontamination is carried out, the commander on the spot should lead his men to "clean ground."

5. Remarks.—When air co-operation is obtainable, blister gas training mixture can be sprayed from aircraft and the use of the stirrup pump dispensed with. Whenever the spraying aircraft is within range, the first action is to engage it with controlled fire from all available small arms weapons; subsequently the commander on the spot will give the verbal warning "spray."

34. Blister gas spray when at rest

1. Object of problem.—To practise leaders and men in the action to be taken when blister gas spray is used against troops who are at rest.

2. Stores required.—Spray detectors and some blister gas training mixture.

3. Situation.—A sub-unit at rest, either by day or by night. Spray detectors have been put out and sentries posted.

4. Action by umpire or director.—Cause a few drops of blister gas training mixture to be placed unostentatiously on one or more spray detectors, at a moment when a number of men are in the open. To note:—

- i. Detectors have been suitably placed and orders to sentries correct, including capes in worn position.
- ii. Correct action by sentry who discovers that spray has fallen, i.e. the verbal warning "spray." (Note that with blister gas training mixture a red stain will not show on the spray detectors.)
- iii. All ranks in the open carry out Part I of personal decontamination immediately. If suitable cover is available, but not where men sleep, Part II should be done under cover.
- iv. Relief of sentries by guard commander to enable them to carry out Part II of personal decontamination.
- v. Arrangements made by guard commander to renew, or swab and subsequently repaint, contaminated spray detectors.
- vi. Exposed food and drinking water should be declared unfit for consumption. This should bring out the importance of keeping food and water covered.

5. Remarks.—When sleeping troops are under cover it will be unnecessary to take special steps to rouse them when spray has fallen, provided the standing order that helmets, eyeshields, capes and boots are worn when leaving cover for any purpose, is enforced; the sentry should, however, give the verbal warning "spray" in order to warn any individuals who may be about in the open. Actual spraying by aircraft should be arranged whenever such co-operation is obtainable.

35. Work on ground contaminated by blister gas

1. Object of problem.—To practise leaders and men in the action to be taken in order to minimize gas casualties when working on ground which has been contaminated with blister gas.

2. Stores required.—Assault bridge. Four sandbags a man. Blister gas training mixture. Ground detectors. Gas warning signs.

3. Situation.—A sub-unit is detailed as carrying and launching party of an assault bridge at X, either by day or by night. On reaching the bridge forming point the commander on the spot is told that the site has been contaminated, but cannot now be altered.

4. *Action by umpire or director.*—Ensure that the bridge site is contaminated on both banks with blister gas training mixture just before the sub-unit reaches it. Arrange for sandbags to be available if asked for, but keep them out of sight. To note:—

- i. The commander on the spot should not be given sandbags unless he asks for them. If he does so, see that these are efficiently tied on.
- ii. Capes in worn position with corners fastened back. Ointment rubbed into all exposed skin (leaving a visible film on the hands) to give protection from vapour, and to give protection to the hands against liquid. Respirators adjusted when gas is smelled.
- iii. Avoidance of obvious liquid as far as possible.
- iv. No. unnecessary sitting down or kneeling.
- v. Personal decontamination as necessary, and marking of area when task is completed.

36. Handling of stores contaminated by blister gas

1. *Object of problem.*—To practise leaders and men in handling and dealing with food stores contaminated by blister gas.

2. *Stores required.*—A dump of stores comprising filled sandbags (representing sacks of flour or sugar), sealed tins (representing tins of butter or jam), wooden boxes (containing tins representing tins of condensed milk and tins of vegetables). Blister gas training mixture. Four sandbags a man. Ground detectors. Gas warning signs. 15-cwt. truck with the following stores on the vehicle: 2-gallon tin of petrol (water for instructional purposes), 2-gallon tin of water, 2-lb. or 7-lb. tin of bleach (sand may be used to simulate bleach during training), g.s. shovel, and some sandbags or rags.

3. *Situation.*—A sub-unit is detailed (in daylight) to collect contaminated stores left behind in a recent move.

4. *Action by umpire or director.*—Ensure that the dump of stores is contaminated with blister gas training mixture. There should be a small heavily contaminated bomb crater just upwind of the dump. Arrange for sandbags to be available if asked for, but keep them out of sight. When contamination is discovered, point out to the commander on the spot what the stores represent. To note:—

- i. As for Sec. 35, para. 4, i to v.
- ii. Doubtful if any food in small sacks can be rendered safe for consumption, but this will depend on degree of contamination of sack.
- iii. Loose sealed tins can be rendered safe to handle by removing the contamination with swabs moistened with petrol. Contents will be unaffected and will be safe for consumption.
- iv. Lightly contaminated boxes containing sealed tins will be safe to handle if covered with bleach paste. If heavily contaminated the boxes should be broken up and burnt. The sealed tins can be handled separately.

37. Action of a gas reconnaissance party

1. *Object of problem.*—To practise leaders and men in the duties of a gas reconnaissance party.

2. *Stores required.*—Blister gas training mixture. Ground detectors. Gas warning signs. Four sandbags for each member of gas reconnaissance party.

3. *Situation.*—By day, during a pursuit or advanced guard operation, leading troops have met blister gas contamination and have gone ahead but have sent back a report giving the location of the contamination. A party, e.g. an infantry section, has been detailed from a reserve sub-unit to delimit the contaminated area and mark a clear route.

4. *Action by umpire or director.*—Select a suitable defile and put down some blister gas training mixture in it, and for a short distance to either flank. Explain to the leader of the gas reconnaissance party the nature of his task. Note action taken, which should be in accordance with Sec. 22, para. 3, ii.

5. *Remarks.*—A variation of this problem could be as follows: A sub-unit is detailed to take up a position in the vicinity of ground suspected of blister gas contamination. The sub-unit commander sends a gas reconnaissance party ahead to mark out contaminated areas.

38. Choking gas against moving tanks

1. *Object of problem.*—To practise crews in the immediate adjustment of respirators, when choking gas is encountered while vehicles are moving.

2. *Stores required.*—C.A.P. generators, to represent choking gas released by means of ground burst projectiles. Thunderflashes, to represent the noise of bursting projectiles.

3. *Situation.*—Tanks advancing (into the wind) are bombed with choking gas from aircraft.

4. *Action by umpire or director.*—Arrange for C.A.P. generators (in depth) to be ignited upwind of the advancing vehicles and, just before the cloud reaches them, thunderflashes to be burst just ahead of the vehicles. Umpires in each vehicle to note:—

- i. Adjustment of facepieces (without breathing in) within 15 seconds of detecting gas.
- ii. Minimum interference with speed of vehicle and duties of crew.

5. *Remarks.*—Vehicles must be moving into the wind. C.A.P. generators should be in depth, e.g. 50 yds. distance; they should also be set out at intervals to cover the frontage on which vehicles are deployed. Note precautions to be observed (see Sec. 23, para. 2).

39. Blister gas against moving tanks

1. *Object of problem.*—To practise crews in the action to be taken in order to minimize delay and subsequent casualties, when individuals and the interior of vehicles are contaminated while vehicles are moving.

2. *Stores required.*—Some blister gas training mixture and a thunderflash, for each vehicle. The thunderflash should be tied to the outside of the turret.

3. *Situation.*—Tanks on the move are bombed with blister gas from aircraft.

4. *Action by umpire or director.*—When tanks are on the move, umpires in each vehicle to ignite the thunderflash and then sprinkle the blister gas training mixture inside the vehicle and on to individuals. To note:—

- i. Part I of personal decontamination should be an immediate action.
- ii. Part II of personal decontamination should include the removal of contaminated overalls or blouses, which should then either be tied to exterior of vehicle or, if this is not possible, jettisoned.

- iii. As gas will be smelled, respirators should be adjusted and ointment applied to exposed skin (leaving a visible film on the hands).
- iv. Contaminated controls, instruments, equipment, weapons and ammunition should be swabbed.

5. *Remarks.*—Decontamination of those external parts of the vehicle which individuals are likely to touch, and more thorough decontamination of the interior, will be necessary when halted.

40. Blister gas against halted tanks

1. *Object of problem.*—To practise crews in the action to be taken in order to minimize subsequent casualties, when halted crews and vehicles are attacked by blister gas shell or bombs.

2. *Stores required.*—Blister gas training mixture and thunderflashes.

3. *Situation.*—Tanks in harbour are bombed with blister gas from aircraft.

4. *Action by umpire or director.*—While maintenance is in progress, ignite thunderflashes and spread blister gas training mixture on outside and inside of vehicles (unless covered by tarpaulins), on dismantled parts, loose tools and on a number of individuals. Put down a few small pools of the liquid to represent effective ground contamination. To note:—

- i. Adjustment of respirators to give protection against initial cloud of fine mist.
- ii. Those individuals near the burst and who have been splashed by the liquid, to carry out personal decontamination.
- iii. Owing to the vapour danger, respirators to remain adjusted and ointment applied to exposed skin (leaving a visible film on the hands).
- iv. Outside contaminated parts of the vehicle likely to be contacted by individuals getting in and out, to be swabbed (preferably with rags moistened with petrol). Interior contamination to be swabbed likewise.
- v. Decontamination of contaminated dismantled parts and loose tools.
- vi. Completion of maintenance work, care being taken to avoid obvious contamination on the ground.
- vii. When work completed, crews should be moved upwind of contamination.

5. *Remarks.*—Whether or not vehicles should be moved clear of the liquid and vapour danger, will depend on the tactical situation.

APPENDIX A

GAS TRAINING INSPECTIONS

(Some suggestions which may be of use to senior officers when carrying out inspections in units.)

1. *Sentries*.—Check written orders for sentries in regard to gas. See whether sentries understand the action to be taken in the event of:—

- i. Spray having fallen (Sec. 14, para. 11).
- ii. Other forms of gas attack (Sec. 14, para. 9).

2. *Respirators*.—Cause the gas rattle to be sounded or the shout of "gas" given. See whether facepieces are adjusted in accordance with the tests of elementary training (Sec. 15, para. 10, i; and para. 11, i and iii). See whether eyepieces show signs of clouding over within a few minutes. See whether the elastic of the headharness has become slack, thus causing a gas leak. Have selected respirator haversacks examined to see whether they contain cotton waste, ointment, eyeshields, anti-dimming outfit and spare sleeve detectors; also ground detectors, in the case of officers, warrant officers and N.C.Os.

3. *Personal decontamination*.—Cause the verbal warning "spray" to be given and see whether all ranks in the open carry out Part I of personal decontamination immediately (Sec. 11, para. 4). Cause a few drops of blister gas training mixture to be placed on the boots, clothing, equipment and weapons of a few men—indicate this to the junior leader—and note action taken under Part II of personal decontamination (Sec. 11, paras. 6 and 7).

4. *Capes*.—Order capes to be put on in the worn position. See whether they are serviceable. See whether the shoulders have all been painted with detector paint, and whether badges of rank have been added where applicable (Sec. 18, para. 10).

5. *General points*.—The following are some further points:—

- i. Where is the gas chamber? (Sec. 27, para. 2).
- ii. When were respirators last tested in the gas chamber? (Sec. 17, para. 1, ii).
- iii. How many men have experienced D.M.? (Sec. 24, para. 1).
- iv. Where is the nearest gas compound? Has the unit improvised one? (Sec. 28, para. 5).
- v. How many men have smelled phosgene? (Sec. 23, para. 1).
- vi. How many men have seen and smelled mustard gas, and have had a drop on their forearm? (Sec. 26, para. 1).
- vii. Has the unit been subjected to practice air spray attack?
- viii. Does every man know how to decontaminate his own weapon and vehicle? (Sec. 12).
- ix. Are gas situations introduced into exercises, and how is this done? (Sec. 1, para. 10).
- x. What shortage of unit gas officers and sub-unit gas N.C.Os.? (Sec. 1, para. 6).
- xi. Has the C.O. attended a Commanding Officers' Course at the Army Gas School?
- xii. Are the medical officer and intelligence officer trained in gas?
- xiii. Have all junior leaders received the appropriate gas training? (Sec. 3 and Appendix D).
- xiv. Are the regimental stretcher bearers trained in first aid for gas casualties?
- xv. What shortage of gas training expedients? (Secs. 23 to 26).

APPENDIX B

NOTES ON THE GAS FILM

1. *Details of the film.*—This is a military training film entitled "Gas." It is available in the 35 mm. and 16 mm. sizes. There is no silent version, and the 16 mm. sound film cannot be shown on a 16 mm. silent projector. The approximate time taken to show the film is 45 minutes. The catalogue numbers are:—

- | | |
|-----------------------|------|
| i. 35 mm. size . . . | B163 |
| ii. 16 mm. size . . . | C163 |

2. *Points to note when showing the film.*—The instructor should make himself familiar with the film so that he can answer questions and comment on any details of teaching which may have changed since the production of the film. Time should be allowed immediately after the showing of the film for comments and questions. Individuals should be given an opportunity to see the film again at a later date. The instructor should bear in mind that the film is an aid to other training and while it can be of considerable value it is not in itself a complete method of teaching.

8. *Comments to be made.*—The instructor should make the following comments immediately after the showing of the film:—

- i. In the film, choking gas was represented by smoke. Choking gases are generally invisible. However a fine mist of blister gas, which may be visible, will arise from air burst and some mixed gas and H.E. ground-burst shells; this acts as a lung gas. The respirator protects the eyes and lungs from this form of "Gas."
- ii. On meeting gas when advancing, troops will, whenever possible, put on their facepieces without stopping. "Hold your breath" means "Stop breathing."
- iii. Carriage of the cape. The latest orders state that the tapes will NOT be put through the D's of the respirator haversack when the cape is worn attached to the body. Situations were depicted in which the cape was required in the worn position. This does NOT mean that the cape will always be in the worn position when on service.
- iv. "Spray" will now be shouted by day or night by the first soldier detecting that spray has fallen. Local Comd. will decide whether or not capes are to be carried in the worn position.
- v. Gas ointment, to be effective, must not merely be applied to the affected part, but must be rubbed in really vigorously for at least 30 seconds.
- vi. The early removal, by careful swabbing, of all free liquid from the boots is necessary. This must be done in Part II of personal decontamination.
- vii. Ointment should be applied to both sides of serge clothing and to the skin underneath wherever contamination can be located and wherever it is suspected. This should be done in preference to cutting out contaminated portions.
- viii. The present issue of eyeshields in Australia is "3."

APPENDIX C

SYLLABUS FOR THE GAS TRAINING OF RECRUITS

<i>Serial No.</i>	<i>Subject</i>	<i>45-minute periods</i>
1. Introductory		
A1.	Respirator fitting. (This should be carried out when the respirator is issued)	—
A2.	Gas film. (Appendix B) . .	1
2. Initial lessons		
B1.	War gases (Sec. 5) . .	1
B2.	Personal gas equipment (Sec. 6)	1
B3.	Description and care of respirator (Sec. 7)	1
B4.	Carriage of respirator (Sec. 8)	1
B5.	Respirator drill (Sec. 9)	3
B6.	Gas cape and light gas suit (Sec. 10) . . .	1
B7.	Personal decontamination (Sec. 11)	3
B8.	Decontamination of weapons and vehicles (Sec. 12) . .	1
B9.	Blister gas detectors and gas warning signs (Sec. 13) . .	1
B10.	Gas alarm system and gas duties of sentries (Sec. 14) . .	1
3. Further training		
C1.	Gas chamber test. (This should be carried out as soon as the individual has been taught respirator drill) (Sec. 17) . .	1
C2.	Gas compound (Sec. 28)	2
C3.	Short talk on enemy gas weapons (Sec. 19)	1
C4.	Gas film. (This second showing of the film should come at the end of the individual's gas training.) (Appendix B) . .	1
4. Tests and further practice		
D1.	Gas tests of elementary training (Sec. 15)	2
D2.	Individuals should be practised, at least once a week, in the action to be taken on hearing the gas rattle or shout of "gas" (while in the prone position), and the verbal warning "spray." (About 20 minutes should be allowed for the thorough carrying out of personal decontamination) . .	—
Total number of 45-minute periods		22

APPENDIX D

SYLLABUS FOR THE GAS TRAINING OF JUNIOR LEADERS

Serial No.	Subject	45-minute periods
1. Introduction		
A1.	A short introductory talk to explain the object of the course and the programme, followed by an inspection of the personal gas equipment of the students	1
2. Training as instructors		
B1.	War gases (Sec. 5)	2
B2.	Personal gas equipment (Sec. 6)	2
B3.	Description and care of respirator (Sec. 7)	2
B4.	Carriage of respirator (Sec. 8)	2
B5.	Respirator drill (Sec. 9)	2
B6.	Gas cape and light gas suit (Sec. 10)	1
B7.	Personal decontamination (Sec. 11)	4
B8.	Decontamination of weapons and vehicles (Sec. 12)	2
B9.	Blister gas detectors and gas warning signs (Sec. 13)	1
B10.	Gas alarm system and gas duties of sentries (Sec. 14)	2
3. Further lessons for junior leaders		
C1.	Tests of elementary training (Sec. 15)	2
C2.	Fitting of respirators (Sec. 16)	1
C3.	Disinfection of service respirators	1
C4.	Gas chamber test (Sec. 17)	1
C5.	Inspection of gas equipment (Sec. 18)	2
C6.	Enemy gas weapons and gas intelligence (Sec. 19)	2
C7.	Effects of weather and ground on gas (Sec. 20)	1
C8.	Blister gases (Sec. 21)	1
C9.	Effects of gas on food and water; blister gas reconnaissance; and decontamination of ground (Sec. 22)	1
4. How to deal with gas problems		
D1.	Practice in dealing with gas problems introduced during out-door exercises (Secs. 29 to 40)	5
5. Revision and examinations		
E1.	Revision	6
E2.	Students examined as instructors in respirator drill and personal decontamination	3
E3.	Students examined orally on the subject matter taught throughout the course	2

*Serial
No.*

Subject

*45-minute
periods*

6. Conclusion

- F1. Concluding talk (preferably by the C.O. or unit training officer) to indicate the lessons to be taught by the junior leader to his men, to emphasize the importance of keeping gas equipment in serviceable condition, and to stress the need for vigilance and to maintain gas discipline at all times in order to guard against surprise

1

Total number of 45-minute periods

50

Notes

1. The syllabus has been drafted as a guide.
2. Best results are likely to be obtained when the number of students does not exceed 16 to each N.C.O. instructor.
3. Each period of 45 minutes allows 35 minutes for the actual lesson, five minutes for questions, and a five-minute break during which students move to the next place of work.
4. Serial Nos. B1 to B10 comprise the ten initial lessons for the individual soldier. Where more than one period has been shown for each lesson, the first period should be devoted to a demonstration lesson, given by the instructor to the students (who, for this purpose, act as private soldiers) with the object of showing how the lessons should be taught. The remaining periods are intended for mutual instruction, i.e. the students themselves practise teaching the lesson.
5. Serial No. C1 to be conducted by instructors, not for the purpose of testing students, but with the object of teaching and practising them in the method of conducting gas T.O.E.T. The students, as trained soldiers, will have passed the tests beforehand.
6. The instruction under Serial Nos. C5 to C8 should be given by the unit gas officer.
7. Serial No. D1 is, probably, the most important part of the junior leader's gas training. The outdoor problems given in Secs. 29 to 40 may be useful as a guide. It is recommended that at least two periods be devoted to night exercises.
8. Serial No. E1 should include two periods at a gas compound (Sec. 28); discussions (especially on C5, C7 and D1); and the Gas Film (Appendix B).
9. Serial Nos. E2 and E3.—For N.C.O. students, oral examinations are recommended in preference to a written paper.
10. A course of 48 periods, at nine periods a day, would occupy five full days, with three periods (the oral examination and concluding talk) on the final morning, e.g. Monday to Saturday.

APPENDIX E

NOTES ON RESPIRATOR CARRIAGE AND DRILL

The positions in which the respirator may be carried, and the drills for obtaining protection from them, are dealt with in Secs. 8 and 9 (Initial Lessons No. 4 and No. 5). Details of the positions and drills vary with the type of connecting tube (short or long) and the type of haversack (Mark VI or Mark VII). The following instructions should be observed:—

1. General

1. Numbers under instruction not to exceed 16 to each instructor.
2. Battle order is required when teaching respirator carriage and drill.
3. Those under instruction to form a semi-circle facing the instructor.
4. Respirators to be inspected at the beginning of each lesson period to ensure that they are serviceable for drill purposes.

2. Carriage of respirator

1. When teaching the positions in which the respirator may be carried, the object is to ensure that the position adopted is correct. Respirator carriage is therefore not taught as a drill.

2. The positions in which the respirator may be carried should be taught in the following sequence:—

- i. Instructor states the position to be taught.
- ii. Instructor adopts position without giving any detail.
- iii. Instructor brings out points in lesson.
- iv. Students adopt position, instructor correcting faults in final adjustment.

3. Respirator drill

1. To obtain protection by adjusting the facepiece, accuracy and speed are essential. When testing for gas, speed is not important, but a correct sequence is necessary. Both are therefore taught as drills.

2. Drill teaching must not be hurried.

3. Before teaching a drill, ensure that respirators are carried in the appropriate position.

4. Respirator drills should be taught in the following sequence:—

- i. Instructor states the drill to be taught.
- ii. Instructor demonstrates actions, explaining as he does so.
- iii. Students imitate instructor, the instructor giving details and performing movements with students.
- iv. Students practise as individuals, instructor correcting faults.
- v. Instructor interrogates students.
- vi. Repetition. Students carry out the drill on word of command of instructor.

5. Whenever the facepiece is removed (and before it is returned to the haversack) the eyeshield and helmet should be replaced in position on the head.

6. At the end of each drill lesson period, the inside of facepiece should be wiped out and eyepieces anti-dimmed.

APPENDIX F

PART I

DESCRIPTION AND CARE OF LIGHT RESPIRATOR

(For issue to specified troops)

1. General

1. The light anti-gas respirator is direct-coupled, i.e., the container is screwed to the left side of the facepiece. The absence of the connecting tube permits unrestrained movement of the head and greater freedom when firing the rifle from the right shoulder.

The light respirator also differs from the GS respirator in that:—

- i. It is half the weight.
- ii. The container can be waterproofed.
- iii. The facepiece is coloured green.
- iv. Fixed eyepieces of toughened glass are provided.
- v. Tissot channels are eliminated.
- vi. Tissot channel are eliminated.
- vi. The haversack can be attached to 1937 pattern web equipment in alternative positions and the prone position can be assumed more comfortably than when the GS respirator is worn in the alert position.

2. The light respirator affords complete protection against all war gases, but as the container is of smaller dimensions it has not quite as long a life in continuous use as the type "E"; it can, however, be easily replaced when necessary.

3. Three sizes will be available—small, normal and large. Personnel unable to be fitted with these sizes and those who are accustomed to use the left shoulder when firing will retain their GS respirators.

2. Description

1. The new respirator is called "Respirator, anti-gas, light" and comprises the following:—

- i. *Facepiece, Mk. II A/L.*—Consists of head-harness, No. 4 Mk. III; camouflaged green rubber mask; fixed eyepieces 2½" diameter with discs of toughened glass; outlet valve complete in holder; inlet valve and container mount. Eyepieces are secured in position with clips which have the ends protected by rubber sleeves; the remaining components are fixed to the facepiece with tinned steel wire covered with coloured adhesive tape. The head-harness is attached to the facepiece by buckles, loops and tags similar to those of the GS respirator.
- ii. *Container, Mk. II L.*—Is a drum type, 4½" in diam. by 2" deep, with threaded neck for screwing into mount; the outer end has a metal cover with a central inlet hole. Two cork plugs joined by a 8½" length of tape are provided for sealing the openings against entry of water. All containers are interchangeable with all facepieces. Once each week the container should be loosened and screwed up again to prevent it seizing.
- iii. *Outfit, Anti-dimming, Mk. VI.*—A cylindrical lacquered tin, 2" in diam. by ¾" deep, containing a cloth impregnated with anti-dimming compound. It is carried in a small pocket at the bottom of the haversack. Mk. V Outfit A/D will be issued with earlier lots of Light Respirators.

- iv. *Haversack, No. L1., Mk. II/L.*—Is made of waterproofed and stiffened canvas dyed khaki green. It is box shaped and closed with a lid which is secured with a "lift the dot" fastener. On the outside are two pockets, with flaps secured by press studs, for carriage of ointment and waste. Inside the haversack there is a large pocket to carry eye-shields, a smaller one for anti-dimming outfit and loop and press stud for securing sling and/or sealing corks when not in use. Attached to the sides of the haversack are two slides webbing 1" for attaching to the web equipment or to the slings. (In some models cadmium plated rings replace the slides.) On the back of the haversack are two clips which serve to attach it directly to the belt of the web equipment in a horizontal position.

3. Operation

1. The circuit of air through the respirator is similar to that in the G.S. respirator except that no tissot channels are provided to direct air over the eyepieces; reliance against fogging being placed on the anti-dimming compound. The container, resembling in section the type "E," allows the pure air to pass by way of the inlet valve directly into the facepiece; exhaled air passes out through the outlet valve.

2. Particular care should be exercised when replacing the container, first to engage the threads of the neck accurately in the container mount, and secondly, to screw the container firmly home on the rubber face of the mount to ensure a gas-tight fit. When replacing the container the mount should be firmly gripped and not the rubber neck, otherwise damage to the facepiece may result.

4. Waterproofing the Container

1. Unless orders are issued to the contrary, one cork sealing plug will be fitted into the outer opening of the container, the other into the inside of the container mount *within the facepiece* when the respirator is carried with the container screwed into the facepiece.

2. When not in use, the plugs will be carried in the haversack and secured by passing the tape joining them under the loop provided to house the haversack sling.

5. Use of Anti-dimming Outfit, Mk. VI

1. Owing to the absence of a tissot channel in the light respirator, resistance to fogging depends solely on the presence of anti-dimming compound on the eyepieces. Anti-dimming compound will be applied each time the respirator is worn. (Sec. 7, para. 6, sub-para ii.)

2. When chemical warfare commences, local command will instruct troops to apply anti-dimming compound daily, in areas where gas attacks are expected.

6. Repair of Respirators

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1. No repairs to the light respirator will be carried out in the unit; the following components, however, may be replaced:—

Inlet valve; container.

2. Respirators requiring other repairs will be returned to Ordnance.

7. Disinfection

1. Disinfection will be carried out by immersion as set out in Sec. 16A, para. 1. All water must be drained from the outlet valve assembly through the two small holes in the outer rim.

8. Cleaning the Haversack

1. The haversack must not be scrubbed with soap and water nor treated with equipment cleaner as both treatments destroy the special finish of the cloth. Mud on the haversack will be removed with a dry brush.

9. Marking the Respirator

1. The light respirator will be marked by attaching an identification disc to the container mount with a piece of whipcord 15" long. The disc will be marked with the soldier's name and number.

2. The haversack will be marked on the inside of the lid in indelible pencil with the soldier's number only.

10. Fitting

1. The light respirator will be fitted as laid down in Sec. 16. Test for gas-tightness (Sec. 16, para. 4) will be made by closing the inlet of the container with a cork or the palm of the hand.

PART II

CARRIAGE AND DRILL FOR LIGHT RESPIRATOR

11. Carriage of the Light Respirator.

1. The haversack No. L1, Mk. II/L, which is the regular issue in AUSTRALIA, is carried in four positions.

i. *Fighting Position*.—On the left side over bayonet and scabbard. The haversack is attached by its slides; in front to the left brace, at the back to the rear end of the right brace of the 1937 pattern web equipment. This position is suited to battle order (Jungle Kit) and does not interfere with the carriage of cape.

ii. *Full Marching Order Position*.—On right side in lieu of water bottle which is carried in the haversack.

iii. *Slung Position*.—The loose one inch sling provided is attached to the slides and adjusted so that the top of the haversack rides level with the top of the belt. The sling is passed over the right shoulder, the haversack to the left rear, with fastener outwards. This method of carriage will not be adopted when equipment is worn.

iv. *On Back of Belt*.—The haversack with opening towards the right is attached in a horizontal position to the back of the belt by means of the clips provided. This method of carriage will be confined to certain units as specified by L.H.Q.

2. Formations may instruct that driver, M.T., whilst in a vehicle may attach the respirator haversack, by the clips, to the vehicle in a convenient position.

12. Respirator Drill—Light Respirator

1. *Fighting Order Position*.—Left side of equipment, over bayonet.
On the warning "Gas" or on encountering gas:—

- i. Stop breathing.
- ii. Push steel helmet to back of head.
- iii. Open flap of haversack (with left hand).
- iv. Withdraw the respirator with left hand, right hand steadying the haversack. Remove corks if fitted.

- v. Remove eyeshields.
 - vi. Hold facepiece with thumbs under the two lower and middle elastics.
 - vii. Place chin in facepiece and bring the harness over the head so that centre elastics are approximately horizontal.
 - viii. Remove any folds in facepiece or twists in head-harness.
 - ix. Breathe out hard to remove any gas from inside facepiece.
 - x. Replace steel helmet and adjust chin strap.
 - xi. Place eyeshields and corks in haversack.
2. *Full Marching Order Position*.—Haversack on right side of equipment. Movement as for 1 above except:—
- i. Open flap of haversack.—Use right hand.
 - ii. Removal of and replacing respirator.—Use right hand for the removal, etc. Left hand to steady haversack.
3. *Slung Position*.
As for Fighting Order position.
4. *On Back of Belt*.
As for Full Marching Order position.
5. *Gas Clear*.
- i. Test for gas (Sec. 9, para. 7).
 - ii. Push steel helmet to back of head.
 - iii. Remove facepiece.
 - iv. Replace eyeshields.
 - v. Replace steel helmet.
 - vi. Replace respirator in haversack after replacing plugs if protection against entry of water is necessary.
 - vii. Button flap.
6. *To Return Respirator to Haversack*.
The respirator is to be returned to the haversack as follows:—
- Hold the facepiece in the left hand by means of the valve holder, chin piece outward, allowing the head-harness to fall inside; fold the container into the facepiece with the right hand, and grasp it with the left hand, fingers over the container; with the right hand, thumb on the outlet valve and fingers on the container, place into haversack, the container on top and facing out.

13. Inspection of Respirator—See Sec. 18

1. Particular attention should be given to the following:—
- i. Head-harness must be strong enough to support the weight of the container fitted to the side of the facepiece.
 - ii. The facepiece should be examined for punctures and tears.
 - iii. The outlet valve assembly should be examined carefully to see that the holder is properly attached to the facepiece and that the valve is functioning correctly.
 - iv. The container mount must be securely attached. If the inlet valve shows signs of curling up it should be removed from the pin and replaced the opposite way up. If the valve has become stiff it should be changed.
 - v. The container must be screwed well home in the mount.
 - vi. The respirator must be complete with a serviceable anti-dimming outfit, Mark VI, eyeshields, ointment, and cotton waste.

APPENDIX "G"

PHOSGENE FOR TRAINING

1. Units should make full use of phosgene in training as far as the present limited resources permit.

2. The safety precautions in "Gas Training (Aust.) 1942," Sec. 28, paragraph 5, i., apply only for persistent gases and are not required when phosgene alone is used. Phosgene will, however, only be released under the supervision of an officer qualified at L.H.Q. or First Aust. Army Gas School and under direction of Div. or Higher Formation.

3. To conserve the limited supplies which are available and to ensure that as many troops as practicable get an opportunity to smell this gas under field conditions, phosgene will be released under the following conditions:—

- i. In favourable meteor conditions; that is when the wind is between 4 and 10 m.p.h. and the atmosphere is near thermal stability. The latter conditions occur between sunrise and one hour after; between half an hour before, and half an hour after sunset if the sky is clear, and at any time during the day when the sky has been over-cast for an hour or more.
- ii. When as many troops as practicable are located within a zone where the gas is plainly perceptible without reaching a dangerous concentration. This is effected by transporting the cylinder across wind at walking pace whilst it is discharging and locating the troops 50 to 100 yards down wind.
- iii. *Safety Limits.*—Troops located between 50 and 100 yards down wind may safely leave off their facepieces until the smell of the gas is plainly perceptible, because even if unprotected, they will not be exposed to a dangerous dose.

The safety distance from the nearest civilian habitation or public roadway located down wind from the point of release is 500 yards.

Phosgene should not be released under conditions of strong inversion, such as a frosty night with a light breeze, as the gas may occasionally travel unpredictable distances under such conditions.

4. Phosgene will never be released for training purposes in timbered country, roads, defiles, built-up areas or in any country where the gas may tend to collect.

APPENDIX "H"

EXERCISES IN BLISTER GAS

1. Introduction

1. All ranks should have confidence in their anti-gas equipment, and in their ability to use it. They should be trained to realise that:—

- i. They can remain in mustard gas vapour for a limited period without serious casualties if protected by respirators and prior application of A/gas ointment.
- ii. They can cross contaminated ground with reasonable care wearing ordinary battle dress and boots, provided the ground is bare or the grass is short. The greater risk from scrub or long grass must be explained.
- iii. They can keep contaminated weapons and vehicles in action with reasonable precautions.

2. In order to instill this confidence and also to develop, in commanders, "gas sense," which implies, inter alia, the ability to decide when full gas precautions are necessary, and when their relaxation (with consequent greater risk of gas casualties) is justifiable, it is desirable that all ranks should encounter blister gas under conditions resembling, as nearly as possible, those likely to be met with in the field.

3. Staff officers (CW) and Technical officers (CW) will be employed to advise as to the extent of any risks run, and to supervise the exercises personally. A Medical officer will always attend the exercises.

4. Stringent safety precautions are not required. With reasonable care, casualties are no more likely to occur than in many other exercises, and the few that do occur should be slight. In all cases, however, men's eyesight **MUST** be safeguarded, and eyeshields will be worn on all occasions when mustard gas is being used and respirators are not adjusted.

5. Precautions must be taken to ensure that there is no risk to civilians or live stock. Access to contaminated ground will be denied for twice the time it takes for the gas to dissipate sufficiently to give a negative reaction to detectors, gas, ground.

6. With experience and practice the methods demonstrated may be improved upon and varied, but it is important in the early stages to avoid unnecessary casualties due to rashness. The object of training is to instil confidence, not to destroy it. The exercises suggested below have been carried out at gas schools without casualties.

2. Exercises for All Arms

1. The following methods are suggested for guidance:—

i. *Remaining in Mustard Gas Vapour.*

Troops wearing respirators should remain in action in an area in which there is a pronounced smell of mustard, for a period of 15 min. in ordinary battle dress. The mustard gas should be put down $\frac{3}{4}$ hour before the exercise starts, immediately up wind of the area within which the troops are to remain. The troops should be allowed definitely to recognise the smell of the vapour before putting on the facepiece of their respirators. A line of four Bombs, ground, 6 lb. 15 yards apart will give a suitable contamination.

ii. *Crossing Contaminated Ground.*

A small area to be contaminated as in i. A group of four Bombs, ground, 6 lb. put down one hour beforehand is suggested as a suitable means of contamination. Bare ground or short grass should be chosen. Troops should pick their way and avoid treading in obvious liquid contamination. They should therefore be taught to avoid the immediate localities of the empty cases or shell craters. Boots should be swabbed with a suitable material, e.g., grass, immediately after crossing the contaminated area.

iii. *Handling Contaminated Weapons.*

All arms should learn to keep in action contaminated weapons and carry out complete decontamination subsequently.

3. Exercises for Particular Arms

1. *Armd. Corps.*

Vehicle should be contaminated with crew inside. Crew to work for a quarter of an hour, then emerge and decontaminate the vehicle. Owing to the extreme difficulty of decontaminating the interior of a tank, the contamination of the outside should be put down with care. Contamination by bursting bomb is not recommended.

2. *R.A.A.*

Before a mustard gas exercise, parts of a gun which are frequently difficult to decontaminate, e.g., rubber, seats, canvas, drag ropes and leather should be removed or covered, as by an A/gas cape. A Bomb, ground, 6 lb. should be burst sufficiently far up wind to avoid gross contamination. The gun should then be manned, such decontamination as is possible in action carried out, and complete decontamination carried out subsequently.

3. *R.A.E.*

Should practice working in contaminated areas, and handling and decontaminating contaminated equipment.

4. *A.A.M.C. Units and Regimental Stretcher Bearers.*

- i. Stretcher bearers should collect dummy casualties from a contaminated area.
- ii. The reception and decontamination of dummy casualties at R.A.P.s and dressing stations should be practised.
- iii. Before a mustard gas exercise the vicinity of an R.A.P. or A.D.S. should be contaminated. Personnel should practise working in mustard gas vapour and should decontaminate a crater up wind of their post. Decontamination of equipment, especially stretchers, should be practised. Re-clothing of contaminated casualties and personnel should be considered.

4. Precautions

1. It is not possible to lay down complete precautions to suit all circumstances. The precautions in each individual case must be dictated by the common sense and gas knowledge of the senior officer present. Gas knowledge must not be regarded as a specialist's subject. Nevertheless, the advice and assistance of G.S.O.s (CW) or Technical officers (CW) will always be sought when planning an exercise. Attention is drawn to the following standard precautions which must always be taken.

- i. Respirators must be inspected before the exercise.
- ii. When respirators are not adjusted eyeshields will be worn; *however, eyeshields are no protection to the eyes against vapour.*
- iii. Ointment A/gas must be applied liberally beforehand to part of face not covered by respirator, and to exposed portion of neck and hands, but not to genitalia or armpits.
- iv. Boots must be well dubbed and in good repair, and swabbed after contact with liquid.
- v. Khaki serge service dress with gaiters (or puttees in lieu of gaiters) will be worn. Troops will not be exposed to vapour in shorts and/or shirts.
- vi. When in vapour concentration the neck and cuffs of the service jacket should be drawn tight.
- vii. To avoid high concentration during training under paragraph 2, 1, i, the contamination should be put down $\frac{1}{2}$ hour before the exercise starts.
- viii. Contaminated ground will be decontaminated or efficiently fenced off and marked at the completion of the exercise. The site must be selected with care to avoid vapour danger to occupants of neighbouring villages or to workmen. Vapour danger from four Bombs, ground, 6 lb. will be negligible 200 yards down wind, but a radius of 500 yards should be taken to delimit the exercise area to ensure that no civilian is inconvenienced and to preserve secrecy.

5. Casualties

1. Accidents will occur, as in all battle training. Opportunity should be taken to stress the minor nature of the injury, the eyes and lungs being protected. If the directions given above are followed there should be no injuries at all, an ample margin of safety having been taken. It should be explained to troops that in operations they could undergo considerably greater exposure without suffering any injury.

2. Whenever injury occurs the normal routine should be followed.

3. Information as to whether the casualty was caused by inadequate personal decontamination or by too great disregard of the gas risk will be passed to L.H.Q.

4. Medical units should report casualties through the normal channels to L.H.Q. (MO7), a careful case history being kept for information.

6. Decontamination

1. In the exercises suggested, decontamination will normally be unnecessary.

2. All clothing that has been worn in vapour for a period of more than 15 minutes, or which may have been accidentally contaminated (the contamination not being visible) must be well aired. If liquid can be seen on the clothing, it must be decontaminated in accordance with the instructions below:—

- i. Clothing contaminated with liquid, and particularly boots in which men crossed a contaminated area, must not be brought into a room or confined space for three days.
- ii. Boots known to be contaminated may be decontaminated by the standard hot water treatment under unit arrangements. This is necessary if, after three days, mustard gas can be smelt. It is not likely to be necessary if the area is as lightly contaminated as suggested and is not crossed until an hour later.
- iii. Any other contaminated clothing and equipment, which has by accident been splashed with liquid mustard gas, should be decontaminated by the unit using methods laid down in FSPB Pt. I, Pam. 10, Aust., 1943.

7. Damage to Equipment

1. In view of the necessity for minimising wear of battle dress, and avoiding permanent damage to equipment, every effort should be made to prevent contamination of any material which may be damaged by a decontamination process.

2. The woodwork of rifles should not be deliberately contaminated.

3. If the boots are contaminated, they need only be decontaminated if they are quite heavily splashed; and the process will be carefully supervised. See section 6 above.

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